1945

NEW ZEALAND

STATE FOREST SERVICE

ANNUAL REPORT OF THE DIRECTOR OF FORESTRY FOR THE YEAR ENDED 31ST MARCH, 1945

Presented to both Houses of the General Assembly pursuant to Section 64 of the Forests Act, 1921–22

The DIRECTOR OF FORESTRY to the Hon. the COMMISSIONER OF STATE FORESTS.

SIR,— Wellington, 17th July, 1945.

I have the honour to present herewith, pursuant to section 64 of the Forests Act, 1921-22, the annual report of the operations of the State Forest Service for the year ended 31st March, 1945.

Only brief references have been made to policy matters of immediate pertinent interest pending the completion of the post-war forest policy statement foreshadowed in last year's report.

The critical examination of past operations, the projection of post-war timber requirements, and the forward planning to meet these as efficiently and economically as possible have necessitated an exhaustive analysis of timber usage and production as seldom before attempted in any country, and has therefore occupied much more time than originally anticipated, but its completion has provided a sound basis of planning for the post-war policy statement now being drafted.

As in previous war years, some of the report is presented in précis form, with comparative statistics for corresponding dates or periods for the previous year shown in parentheses.

I have, &c.,
ALEX. R. ENTRICAN,
Director of Forestry.

The Hon. the Commissioner of State Forests.

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REPORT

CHAPTER I.—FOREST POLICY

1. *General Administration.*—Further delegation of detailed timber-control activities to relevant trade organizations has allowed increased concentration upon planning and preparatory work for rehabilitation projects, and upon the long-term post-war forest policy statement commenced last year.

2. *Staff Organization, Recruitment, and Training.*—A policy of making regional administrative positions open to officers of all three divisions—Clerical, General, and Professional—has been adopted as essential to the development of a highly competent and balanced staff. Recruitment for all staff categories, including technical, field, and clerical officers, as well as leading hands and foremen, has been actively pursued as essential to the prompt and effective implementation of post-war rehabilitation projects. The Forest Service Training Centre at Rotorua went into operation during the year with two short courses for timber measurers, which are to be followed by courses in administration for senior field officers, in log scaling and timber cruising for junior field staff, and in general forest work for leading hands and foremen. Post-graduate courses for professional officers will follow next year.

3. *Indigenous Forest Resources.*—Preparatory work for the National Forest Survey to be undertaken as a major post-war project has been considerably advanced by its assignment to a specialist forest officer, who not only has the benefit of being one of the officers engaged on the war-time census of British woodlands, but more recently has been studying the latest forest survey methods in North America. The services of this trained specialist will ensure a much earlier completion of the survey than had previously been anticipated.

4. *Indigenous Forest Management.*—The downward trend in forest reconnaissance, unavoidable during the war period as a result of staff shortages, has at last been arrested and as the result of accessions to the cruising staff important reconnaissance work has been effected and increased activities planned for the current year. The immediate objective of all field-work must still remain the cruising ahead of two years' requirements for all mills operating on State forest, but of equal importance is the reconnaissance and demarcation of other resources which will expedite the development of new mills required during the post-war period either to replace old ones cut out or to further expand production. Wherever the resources are sufficiently large and compact, the objective is to bring areas under working-plan management whereby the forests will be worked continuously for as long a period as twenty, or preferably thirty, years so that not only will efficient plants equipped with modern machinery, &c., be justified, but also very much improved living accommodation and amenities for employees.

5. *Indigenous Silviculture.*—The evolution of a silvicultural system for rimu still remains the outstanding problem in the management of the indigenous forests. The widespread distribution of the species is regarded as a reason for believing that its silviculture should be simple, but the reverse is the case, an important contributing factor being its shy seeding proclivities and the intolerance of seedlings to light and drought. With a return to normal departmental activities in the post-war period it is planned to assign some of the silvicultural staff to special investigations bearing on these subjects.

6. *Exotic Forest Management and Resources.*—Assessment surveys and sample plot investigations have been actively pursued as the basis of working plans for all State exotic forests. They are no less essential to the development of a sound national forest policy. Preliminary indications are that the total annual growth in the exotic forests is very much less than commonly believed, so much so that in the State exotic forests it will be necessary to limit sawn-timber production in the immediate future much more than has been envisaged previously if the country's future requirements in high-grade timber are to be met from local sources and not imported.

7. *Exotic Silviculture.*—The results both of assessment surveys and of trials in the sawing, drying, and utilization of young insignis-pine timber for house building have clearly demonstrated the bad effect of 8 ft. by 8 ft. planting on insignis-pine stands in the pumice lands of the Bay of Plenty and Taupo districts and the wisdom of the Department in reverting to closer spacings. There is little doubt that in the interest of producing a significant proportion of heart as well as defect-free timber every compartment of insignis pine which can be treated by appropriate silvicultural measures should be managed on at least a forty years' rotation and some even on as long as a seventy years' rotation. Failure to do so can only defeat the national forestry objective of supplying the whole of the Dominion's future softwood requirements in all grades and qualities.

Continuing observations upon clear-felled areas of insignis pine in the Rotorua Conservancy show that natural regeneration cannot be relied upon universally even in that district, results appearing to vary with such factors as aspect, exposure, &c. On some of the more recently felled areas on the Whakarewarewa State Forest natural regeneration has been materially poorer than on the earlier cleared areas, and on even the oldest areas in the Waiotapu State Forest results have been so unsatisfactory as to indicate the imperative necessity for further investigating the use of light burning operations as an aid to regeneration and the possible reversion to planting operations for re-establishment.

8. *Land Acquisition.*—In land acquisition the Forest Service observes a long-established policy of avoiding the enclosure of extensive areas of good farming land, but requires small areas of good quality soil for the growing of exotic hardwoods, the more extensive planting of which is essential to a sound forest policy and is to be undertaken as a post-war project.

9. *Forest Fire Protection and Soil Conservation.*—For twenty-five years the Forest Service has successfully protected against fire some 15,000,000 acres of State forest, Crown lands, Native lands, national parks, &c., and thereby made the greatest single contribution by any one national body to

the conservation not merely of New Zealand's forest wealth alone, but also of the great soil and water resources of the Dominion. It is continuing to intensify this protective activity and records with deep satisfaction the promising reinforcement of its policies by numerous Catchment Boards set up during the year under the Soil Conservation and Rivers Control Act, 1941. Ever-increasing co-operation by Maori interests, by forestation and sawmilling companies, and by local bodies is being continually sought and achieved in the belief that decentralized and local fire protection can be made the most effective form of forest conservation.

Further experience with a standby aerial fire patrol provided by the R.N.Z.A.F. over the 1944–45 fire season fully demonstrated the potentialities of this form of protection, and a departmental officer serving with the Armed Forces overseas has been seconded for experience in North America in the use of new types of aircraft for both fire-detection and the control of actual fire-fighting activities through radio contact with the suppression crews.

10. *Forest Utilization.*—The carefully nurtured hopes of the Forest Service that the whole of the expansion in timber production required for the post-war period could be met by the exotic forests have suffered a serious setback as the result of an exhaustive series of trials in the logging, milling, drying, grading, and utilization of young insignis-pine timber for house-framing. Due to a variety of causes, principally the use of wide planting espacements and failure to prune and thin at appropriate times, trees have grown such heavy branches that when converted into sawn timber, boards and scantling, &c., are characterized by large knots of 1½ in. or more in diameter.

That boards of 5 in. and up in width could be used not merely for sarking and sheathing, but also for some grades of flooring, had been known to the Forest Service for some years as a result of its own building activities. What had not been sufficiently appreciated, as has now been demonstrated by large-scale tests, was the fact that in small dimension scantling such as 3 in. by 2 in. and 4 in. by 2 in.—the sizes most commonly employed for studding—the knots are relatively so large that an inordinate number of pieces either distort so badly or display such poor strength as to make them unusable for studding or any alternative purpose. Only in widths of 5 in. and up does the influence of knots tend to become insignificant in dimension stock—*i.e.*, 2 in. in thickness—thus allowing an appreciable quantity to be used for floor-joists, roof-trusses, and other members of large section and at the same time leaving the reject material in a form suitable for a variety of alternative purposes such as boxmaking, &c.

The trials have therefore served to bring into sharp focus the necessity for persevering with the original policy of orthodox forest management under which the insignis-pine stands were to be so treated silviculturally as to yield a final crop of relatively large diameter trees with a high percentage of heartwood and the butt logs relatively free of knots as a result of early pruning of laterals. If henceforth this policy is rigidly observed, then it should be possible in another thirty years' time to produce a range of qualities and grades similarly priced to those yielded by the rimu forests. The rimu price structure, in accordance with universal practice in the timber trade, is based on relatively high prices for dressing or finishing grades of heartwood quality and on low prices for framing timber of sap quality. Young trees of insignis pine, however, even from closely spaced plantings, produce virtually no finishing grades or heartwood timber, and, inasmuch as the framing timbers of sap quality which they do yield are the only grades of appreciable quantity and high use value, they naturally must carry a relatively high price to give an adequate forest return, leaving the boxing timbers, &c., of poorer use-value as the low-priced grades. Thus, instead of young insignis-pine framing timbers being low priced as in the case of rimu, they are high priced, and what further accentuates the difference is that for house building the sappy insignis-pine timber must be both kiln-dried and treated with an appropriate wood preservative to make it as suitable for use as the rimu, which requires neither drying nor preserving.

The cumulative effect is that for building purposes timber from young insignis-pine trees is very much more expensive than rimu. Not until such time as rimu prices increase materially or a wide range of both finishing and framing grades is available from old growth, properly managed insignis-pine stands will the exotic timber be able to compete strongly with the indigenous rimu. For this reason the reconnaissance of new indigenous forest areas has assumed added importance and appropriate expansion of the necessary field staff is being accelerated.

11. *Forest Finance.*—As foreshadowed in last year's report, a member of the Forest Service accounting staff seconded for duty with the forest authorities in Great Britain, Canada, the United States of America, and Australia has returned to New Zealand for the purpose of making appropriate recommendations to the Government on the reorganization of departmental estimates and budget control, the mechanization of accounts, and the recasting of forest finances. For the time being mechanization of accounts has been accorded first priority as a prerequisite to the enormous expansion of departmental activities involved in proposed rehabilitation projects. Some progress has been made in negotiations with the Treasury Department for the transfer of timber-control expenditure from the State Forests Account to the War Expenses Account.

12. *Rehabilitation Projects.*—Over two years of painstaking work by many senior officers have gone into the development of Forest Service plans for rehabilitation work during the first five-year post-war period. The original and main programme of work involving on the average a trebling of departmental expenditure for the year ended 31st March, 1945, has been confined to immediately essential works, representing in no small measure an accumulation over very many years of deferred silvicultural treatments, principally to the exotic forests. With the overtaking of these accumulated deficiencies towards the end of the five-year period it is planned to reduce the rehabilitation complement by about 40 per cent., leaving the Forest Service with a carefully selected and trained personnel well housed and properly organized for efficient and economic operation. A supplementary programme of forest improvement works not immediately essential or economic has been prepared against the eventuality of employment having to be arranged for an increased number of men over a relatively shorter period.

CHAPTER II.—ADMINISTRATION

13. *Permanent and Temporary Staff.*—Permanent, 254 (224); temporary, 171 (145).

The Forest Service is committed not only to extensive rehabilitation schemes, but also to normal departmental expansion, and is actively engaged in the recruitment of additional technical, field, and clerical personnel. The increase shown is accounted for largely by the technical trainees recruited during the year, but it is already apparent that to staff the post-war programme the Forest Service must recruit some senior officers either from other Departments or from outside the Public Service.

Efforts to secure junior field staff made some progress during the year, but continuing man-power restrictions and the higher rates of pay with overtime in other industries are factors which preclude any immediate relief. Nevertheless, it is an urgent necessity that key workmen be obtained now for development into leading hands, foremen, and even forest rangers prior to the commencement of the post-war programme. The only source that could possibly supply the type of young fit men in the number required is the replacement drafts from overseas, and it is hoped that as further drafts return sufficient suitable men will become available as to ensure the smooth functioning and rapid development of the Department's post-war programme.

14. *Military Service.*—Second New Zealand Expeditionary Force, 48 (58); R.N.Z.A.F., 31 (23); Territorial, 4 (13); Navy, 14 (11). It is with regret that the deaths on active service of two more officers must be recorded.

The Government has continued its policy, in the case of members of the staff completing their service with the Armed Forces overseas, of seconding them for duty with forest authorities in other countries before returning to New Zealand. Two such members of the staff have already completed their tours of duty in Great Britain and North America, while another three have recently proceeded to Canada and the United States of America for the same purpose, two of them after investigational work in Italy. Excellent results have followed, and the whole scheme has been warmly commended by overseas authorities.

15. *Casual Staff.*—Average for year, 992 (915).

Throughout the year no major improvement has occurred in the numerical strength of the labour personnel, and some forests have insufficient man-power to combat fires.

The Forest Service employs men under the conditions of the Timber Workers' award for harvesting activities such as logging and milling, &c., but for silvicultural operations there is a special industrial agreement—the State Forest Workers' agreement. Under the latter, the Forest Service has been unable to secure even for the fire season the same priority for the recruitment of available man-power that is accorded the food-producing and some other industries. Moreover, the Department has withheld in this section of its undertakings very few men on appeal from the Armed Services, and while the Forest Service cannot therefore operate in the present "replacement" scheme with men from the overseas Forces it is believed that the gravity of its man-power position will be recognized by the man-power authorities, and an adequate complement of suitable labour provided.

16. *Honorary Staff.*—Honorary Forest Rangers, 217 (250); 28 new appointments and 61 resignations or appointments expired due to effluxion of time or removal from district.

17. *Health of Staff.*—Special efforts have been made to secure additional staff for timber-measuring activities both on account of increasing work and to give some relief to the older officers still engaged on these arduous duties. Extra duties involving overtime and the forgoing of some annual leave are still necessary, and the general health of the staff—particularly of the older appraisal officers—can only be regarded as fair. In this connection plans are being formulated which, when staff become available, will permit the cessation of timber cruising during some of the winter months.

18. *Safety of Employees.*—Total accidents, 149 (256), made up as follows: cuts 25 (67); strains 38 (61); fractures, 8 (4); crushes and bruises, 23 (78); septic wounds, 16 (23); eye injuries, 7 (7); miscellaneous, 18 (16). In addition, it is reported with regret that there was one fatal accident; an employee was crushed by a rolling log on a loading-bank.

It is satisfactory to record that the total number of accidents for the year shows a reduction of over 100 from the previous year, and that some 60 per cent. comprise minor injuries.

19. *Compensation to Employees.*—The Service continues to carry its own accident-insurance risk, and the total compensation payment, total wages, &c., are as under:—

Year.	Total Payments.	Total Wages.	Per Cent. (Approx.).
	£	£	£ s. d.
1943–44	4,804	255,611	1 17 7
1944–45	5,774	292,483	1 19 5

For the year the estimated premium payable for a comprehensive accident policy would have been £12,798; a saving of £7,024 has thus been effected.

The rate per cent. is adversely affected by the inclusion in the total payments for the year under review of a sum of £1,036 incurred in respect of the death of an employee during the preceding year;

20. *Recruitment.*—The main source of field staff recruitment continues to be the secondary schools; from a record number of applicants (88), 22 trainees were appointed during the year, 7 of whom have commenced study for a B.Sc. degree. Three trainees entered the Armed Forces, bringing the number so serving to 30, so that out of the total of 61 appointed to date, the number actually being trained is now 31.

In addition to the above long-term scheme of staff recruitment, involving a period of six to seven years' training, opportunities are being provided for older and more experienced men, particularly ex-servicemen, to join both clerical and field staff after relatively brief training.

21. *Training.*—Two groups of junior recruits are receiving departmental training, viz.:
(*a*) Professional trainees (15), who are given the opportunity of graduating in approved science subjects as a preliminary to intensive forestry training; and
(*b*) Field trainees (16), who are posted to forest stations for experience and training in all branches of a field officer's duties.
The training of both groups will culminate in competitive courses at the Forest Service Training Centre.

Two short specialized courses were conducted during the year at the Training Centre, located at Rotorua. Instructors were drawn from the permanent staff and 21 men (all but one being temporary employees) were given practical and theoretical training in timber cruising duties. Plans for a refresher course for senior field officers are well advanced; and to overcome the acute shortage of indigenous forest officers vacancies have been advertised for timber-measurers, the training of whom will involve further competitive courses.

The saw-doctors' school at Waipa State Mill continued throughout the year; three ex-servicemen at present receiving instruction.

22. *Examinations.*—One trainee graduated (B.Sc.) during the year.

23. *Allocation of Duties.*—As indicated in para. 13, projects within the post-war programme cannot be staffed with the present key personnel, and plans are being prepared which will re-allocate the duties of all senior officers. Until additional personnel is available, however, little progress is possible.

Timber-control activities still require major attention, particularly from senior officers in Head Office and in the conservancy offices. Additional duties assumed during the year have been limited to the changing phases of timber control and the active participation by Conservators and senior officers as appointees on local Catchment Boards set up under the Soil Conservation and Rivers Control Act, 1941.

24. *Field and Office Inspections.*—On the field side priority has been given to projects involving both expanded timber production and post-war requirements of land for afforestation, particular attention being given to proposed new areas in districts without local timber-supplies for the future. Other field inspections have been limited to special reviews and check appraisals.

Office inspections were previously carried out by the Accountant, but changes following the retirement of the Chief Clerk at the commencement of the year made this procedure impracticable for the time being. Annual reports on officers, staff training, and allied personnel matters have been supervised by a member of the professional staff specially assigned to these duties.

25. *Conservancy Organization.*—With the formulation of post-war plans for a large number of new and widely dispersed forestry projects the necessity for creating numerous minor territorial charges has become acute, and a commencement with their organization has been made with a view to making some of the more essential appointments in the immediate future.

26. *Inter-departmental Co-operation.*—Acknowledgment is recorded of the ready co-operation and help received from the heads and staff of numerous State Departments enabling the work of the Forest Service to proceed with due expedition. Special reference is made to the Lands and Survey Department, which carries out all land purchases as well as co-operating in other matters of land administration; and also the New Zealand Railways and the Transport Department, which have been extremely helpful in the solving of transport problems connected with the distribution of timber.

CHAPTER III.—CONSTITUTION OF STATE FORESTS

27. *Changes in Area.*—During the year 75,077 acres were set apart as permanent and provisional State forest and 5,264 acres withdrawn from reservation—a net increase of 69,813 acres. The total area under State forest reservation is now 9,099,163 acres, representing 13·7 per cent. of the total land area of the Dominion.

The area permanently reserved totals 6,157,703 acres, or 67·67 per cent. of the total State forest area (see Appendix 1).

28. *Changes in Status.*—An area of 1,146 acres of provisional State forest was permanently reserved. Of the area withdrawn from State forest reservation 2,024 acres were temporarily withdrawn for adjustment of boundaries, the remainder being made available for settlement purposes.

CHAPTER IV.—FOREST MANAGEMENT

29. *Surveys.*—Topographical surveys were carried out over 390 acres of State forest prior to afforestation, while forest-type surveys extended over 229 acres. In connection with timber appraisals, boundary surveys of 168 areas, totalling 18,838 acres, were completed, and for the reconnaissance of timber resources 9 areas, comprising 16,092 acres, were surveyed.

Continued use is being made of aerial photography for assessment surveys, forest inventory, and preliminary investigation of forest areas. Three mosaic copies and 375 prints were added to the library during the year, while four duplicate mosaic copies were obtained for use in the conservancy offices. The Forest Service library of aerial photographs now contains 33 mosaics covering 1,020 square miles. Work in hand by the departmental contractor amounts to the survey of 1,700 square miles and the preparation of some 50 mosaics; projected surveys cover approximately 2,000 square miles.

30. *Mapping.*—Work during the year was again limited mainly to the recording of current operations. Additions were made to 37 stock and operational maps, while 20 forest atlas sheets were renewed and 27 new plans recorded. The provisional one-mile series of military maps compiled by the Lands and Survey Department have proved most useful for preliminary work in connection with forest inventory and reconnaissance, and the series when completed will make a valuable addition to the Forest Service records. Arrangements have been made with the Lands and Survey Department for the preparation of topographical plans from aerial photographs of State forest areas which are to be afforested, plans for one area—Gwavas Forest, 8,645 acres—being now in hand.

31. *Forest Management Staff.*—One professional officer returned to duty from military service overseas, having been a prisoner of war for four years. Various duties connected with timber control, post-war rehabilitation projects, and inspections, valuations, and reports for other Departments, and particularly work connected with soil conservation committees and Catchment Boards under the Soil Conservation and Rivers Control Act, 1941, again prevented the professional forester staff from devoting full time to forest management.

32. *Forest Working Plans.*—Hanmer State Exotic Forest, productive area 7,684 acres, main species by area Corsican, ponderosa, and insignis pines, and larch, was brought under working plan. The main prescription is a thinning one for production of round timber and firewood only, and no cutting of saw-log timber until the forest is ripe for the purpose.

Under the working plan for the kauri working circle the normal cut was exceeded, although the sanctioned maximum additional cut for extraordinary requirements connected with the war was only availed of to the extent of about one-half, in contrast to an overcut the previous year of 80 per cent. Special efforts were made to concentrate as far as possible on removal of dead standing kauri, thus reserving the increment-bearing living trees, but, unfortunately, this could not be achieved to the desired extent. In fact, owing to continued wet weather for serveral months, preventing extraction from several forests, Ministerial approval was obtained to an alteration in the working plan to permit the cutting, previously unpermissible, of living kauri in a restricted accessible portion of Waipoua Forest.

Assessment of growing stock was completed over 12,560 acres of exotic forests, as follows: Puhipuhi, 160 acres; Maramarua, 1,400 acres; Kaingaroa, 9,800 acres; Golden Downs, 300 acres; Balmoral, 900 acres. In addition, over 2,000 chains of strip plot have been run and pruned in readiness for enumeration. Rangataua Forest, comprising indigenous pole beech, mature beech, and mature beech-rimu types, was assessed over 6,540 acres by the line-plot method. Eyrewell Exotic Forest, previously comprising 33 compartments averaging 527 acres, was resubdivided into 73 compartments averaging 238 acres.

CHAPTER V.—SILVICULTURE

33. *General.*—Silviculture was once more confined to that which could be performed by the bare labour complement necessary for fire-protection and other essential maintenance and caretaking work. The total area artificially afforested for the first time rose somewhat, to 1,748 acres, while pruning and thinning increased slightly, to about 1¼ per cent. of the total planted area. Under these wartime conditions many compartments, chiefly of insignis pine, are becoming too old for pruning, and where thinning is in arrear it is proceeding by way of natural suppression, though with an unavoidable loss of forest produce which under a normal thinning regimen would be harvested. The area blanked and restocked again exceeded that newly planted. Silvicultural statistics are presented in Appendix H.

34. *Natural Regeneration.*— The occurrence and survival of kauri natural regeneration in compartments worked under working plan have been sporadic, and have been supplemented by planting of kauri in places where the likelihood of regeneration becoming established within a few years is remote.

Natural regeneration of insignis pine following clear felling in Whakarewarewa Forest is proceeding satisfactorily, although planting is necessary in patches where tree-tops were piled and where invasion by annual weeds is abundant (see also paragraph 41).

Whirinaki Forest podocarp compartments, clear felled since 1939, have proved to be almost devoid of regeneration, evidently owing to the heavy slash which is unavoidable in working heavily stocked mature podocarp stands.

35. *Interplanting Indigenous Forests.*—Worked-over podocarp forest amounting to 120 acres was interplanted with shade-bearing exotic trees and 6 acres with indigenous trees, while 2 acres of worked kauri forest were interplanted with kauri.

36. *Afforestation.*—The area of land under fern, scrub, &c., planted for the first time was 1,620 acres, and 869 acres were blanked and 1,088 acres replanted. Indigenous and exotic tree seed collected amounted to 25 lb. and 496 lb. respectively.

37. *Nursery Operations.*—From 1,088 lb. tree seed (including 12 lb. indigenous) sown, 3,040,000 seedlings were obtained; trees lifted for planting amounted to 3,100,000, while 500,000 trees were lined out. At the close of the year there were 4,500,000 trees in the nurseries.

38. *Tending of Indigenous Forests.*— In several kauri forests patrolmen continued the releasing of young kauri from overhanging scrub, &c., while 132 acres of exotic trees interplanted in worked podocarp forest were released from overtopping second growth.

39. *Tending of Exotic Forests.*—Release cuttings amounted to 1,349 acres, low pruning to 4,673 acres, and high pruning to 391 acres. Thinning was completed on 952 acres, and 276 acres were clear-felled.

40. *Silvicultural Investigations.*—Further trial plantings aggregating 22 acres were made on four newly acquired areas suitable for formation of exotic forests. The method of rectangular spacing of trees, used years ago in certain compartments, was reverted to an a trial basis, and small areas were planted at spacings of 12 ft. by 6 ft., 10 ft. by 5 ft. and 8 ft. by 4 ft. for insignis pine, and 8 ft. by 4 ft for Coriscan and ponderosa pines. Under the present trials, however, the greater of the two distances mentioned in each instance, and comprising the distance between tree rows, was run across the contours to facilitate future log extraction by mechanical means.

In two conservancies felling and extraction of marked thinnings by contract was considerably extended, and produced good results from the viewpoints of both reduced costs (and greater output per given period) and minimum degree of damage to crop trees.

An unthrifty stand of pure jack-pine was partially cleared and underplanted with Lawson cypress, Macrocarpa, and Douglas fir, with good results to date.

Four heavy thinning trials, each on 10 acres, were made in fifteen-year insignis pine on Eyrewell Forest.

Other experiments include planting of poplars on extended areas, nursery raising of common ash with the object of recommencing the planting of that tree after a break of over forty years, and extension of investigations of natural regeneration of indigenous beech.

41. *Experimental Plots and Statistical.*—Plots established in 1937 in an underscrubbed portion of a mature kauri forest were recounted. Miniature tree-fern is still proving troublesome, having re-invaded, and prevented regeneration on, plots which had been recleared in 1941. From a single seed-fall 18,000 to 25,000 kauri seedlings per acre germinated, but only removal of the ground cover enables this result to be obtained. Even so, the fibrous humus layer, which dries out in summer, causes severe mortality, although a mean of 4,672 seedlings per acre by 1941 increased to 9,051 by 1945. Quadrats around which a trench had been dug showed a markedly superior regeneration, indicating that on untreated areas the development of seedlings suffers a great deal from fierce competition by tree-roots.

Fifteen plots established for the study of natural regeneration of insignis pine after clear-felling on Whakarewarewa Forest were recounted, and showed an average of 3,000 seedlings per acre, ranging from 400 to 11,000 per acre. Mortality from the bast beetle *Hylastes ater* varied from nil to 5 per cent.; average 2 per cent. The shoe-string fungus caused negligible mortality. Germination is incomplete on plots established in 1944, but the indications are that a good stocking will be secured.

Two newly established plots for investigating natural regeneration of twenty-five-year ponderosa pine on Balmoral Forest revealed a stocking of 2,370 seedlings per acre. This is of interest because this species has so far shown little sign of regeneration anywhere in the Dominion, even under the oldest stands. Plots in wind-blown insignis pine in the same forest upon recounting revealed per-acre stockings varying between 1,640 and 3,880, with but slight losses from *Hylastes ater*.

On Balmoral and Eyrewell Forests standard growth and yield plots in insignis and Corsican pines received the standard quinquennial remeasurement and were subjected to heavy and medium thinnings.

Valuable data on the mortality and suppression in different crown-classes of a sixteen-year unthinned insignis-pine compartment were obtained from remeasurement after four growing seasons of a 1-acre plot on Maramarua Forest. The total of 450 living trees in 1941 fell to 345 by 1945. The former comprised 358 dominants and co-dominants, 67 intermediates, and 25 suppressed trees; and the latter 230, 98, and 17 in the respective crown-classes. Mortality comprised 48, 38, and 19 respectively, total 105. Of the dominants and co-dominants, 80 became intermediates, and 11 of the latter passed into the suppressed class. Net annual basal area increment was 2 per cent., being an increase from 169 to 184 square feet, and crop trees (mainly dominants and co-dominants of good form) showed an annual basal area decrement of 3 per cent. and thinning trees (mainly intermediate and malformed trees) an annual increment of 13 per cent. The last-mentioned increase was, of course, caused in the main by numerous co-dominants of 1941 being left behind in the lower story. These results clearly demonstrate what is going on in many compartments in the State exotic forests owing to unavoidable postponement of thinning until labour again becomes available (see paragraph 33). Under orthodox thinning treatment the annual basal area increment of selected crop trees should be about 4 or 5 per cent. in place of a decrement.

42. *Forest Botany.*—The collection and summarizing of data according to phenological projects now in operation has continued over the past year, but the full value of these data will not be developed until information from many more years' observations has accumulated. Seed stored according to a project begun in 1941 has been tested during the year, and results so far obtained indicate that for indigenous species, such as kauri and kahikatea, storage for any length of time must be at 10–15° F., preferably sealed. For kauri-seed, which does not germinate as well when kept for any length of time even under the best storage conditions as it does when fresh, stratification prior to sowing appears to be deleterious. On the other hand, stratification increases speed of germination in all exotic species studied—American eastern white-pine, Corsican pine, Douglas fir, insignis pine, lodgepole pine; and, generally speaking, the three-year storage term has proved that all the usual storage methods are quite suitable for these species. The 1944–45 season has again been a poor seed year. A number of seed exchanges have been made, chiefly with Australia. Additions made to the herbarium during the year now bring the total number of species to approximately 500.

CHAPTER VI.—FOREST PROTECTION

43. *Fire Damage.*—The December–January period, in which the worst fire danger often occurs, was generally wetter than usual, but short periods of threateningly high fire hazard were experienced in several localities in the late spring and February–March periods. This is evidenced by the number of fires occurring in and adjacent to State forests, for of the total of 52 fires covering 3,920 acres and investigated by Forest Officers, 23, totalling 3,370 acres, occurred in late spring and 22, involving 520 acres, in late January and early February. The total number of fires reported from Forest Service lookouts was 1,512, but only 17 of these, covering an area of 1,995 acres, were in State forests; approximately 200 acres of cut-over forest was burnt, the balance being fern and scrub country. The only serious fire in a State forest occurred in the Waiotapu Forest, where, in November, 57 acres of fifteen-year-old *Pinus ponderosa* and *P. radiata* were burnt. The fire originated during burning-off operations on a firebreak, a spark being carried over an 18 ft. road and starting an outbreak half a chain inside a dry swamp. Immediate efforts to get this fire under control were unavailing, and in a short time it had spread into the planted area. Prompt action by the fire-fighting crews confined the fire to the extent above mentioned. Most of the timber killed by the fire has since been salvaged.

During the year fire destroyed two sawmills owned respectively by Sherriff and Co., Ltd., Alton Valley (Southland Conservancy), and Taupo Totara Timber Co.'s No. 2 Mill, Mokai (Rotorua Conservancy).

44. *Fire Detection and Control, &c.*—Humidity observations and fuel indicator sticks have again proved invaluable aids to the determination and prediction of fire hazard, but the light fuel indicator sticks made from *Pinus strobus* have been showing an apparent loss of volatiles during the period of exposure, indicating the necessity for a more severe pre-conditioning treatment of all new sticks.

In order to improve the fire-control and fire-fighting organization in the Rotorua Conservancy, plans are being developed for the erection before next fire season of an up-to-date fire-control room at Kaingaroa Forest headquarters, with all necessary maps, telephones, and radio equipment. This will take the form of a separate building later to be incorporated in the projected administration block.

Further progress has been made in the detection of fires on the Kaingaroa Forest by the erection of a major lookout station at Ngapuketurua. This will be manned next fire season and will provide valuable additional bearings for the location of fires by resection of bearings.

Arrangements with the Air Department, whose co-operation is gratefully acknowledged, resulted in an aircraft being kept in readiness at the Rukuhia Aerodrome for patrol work over an area of some 7,000 square miles extending eastwards from the Main Trunk Railway to the Rangitaiki River and northwards from Tokaanu to the Bay of Plenty. It was arranged that the aircraft would be called out when dangerous fire weather conditions existed and to assist in the suppression of fires. The plane was to maintain two-way radio communication with Kaingaroa fire-fighting headquarters, and to report the location of fires by grid map references.

During the fire season, extending from 1st October to 15th April, a total of six patrol flights were made, a State Forest Service officer being picked up at Rotorua as observer on each occasion; fourteen fires were investigated, but all except one proved to be in open fern country and did not constitute any danger to forested areas. One, however, was endangering a sawmill, and the miller on being informed was enabled to burn back and save the mill. Due partly to the distances involved, the two-way radio communication was not entirely satisfactory, but improvements in this phase are confidently expected next season.

In order that improved fire protection may be afforded to areas of exotic forest, seventeen Ford "Desert Mule" chassis were purchased from the Army Department. These vehicles comprise a short-wheel-base chassis with four-wheel drive powered by a Ford V8 engine mounted in the rear. The chassis are mounted on 20 in. by 10·5 in. run-flat shrapnel-proof tires eminently suitable for traversing rough country. The fire-fighting equipment which has been specially designed to fit on this chassis comprises a 400-gallon tank, a high-pressure geared pump, 1,000 ft. 1½ in. canvas hose with plain and fog nozzles, 30 ft. of suction hose, and two permanent stand pipes for operating a powerful stream of water from both the front and the rear of the vehicle while in motion. The operators from their positions can cover a complete circle.

The completed vehicle carries a crew of eight as well as equipment comprising shovels, axes, spades, ropes, picks, eight Indian knapsack pumps, first-aid equipment, and food; with its full load of equipment and water—a total weight of 6¼ tons—it is capable of high speed over flat country and, due to its main and auxiliary gears, is able to negotiate rough surfaces and grades of 1 in 3. Five of these machines have been completed and delivered—2 to Rotorua Conservancy, 2 to Canterbury, and 1 to Nelson. The remainder will be delivered before the next fire season, which will give the total allocations as follows: Auckland Conservancy, 5; Rotorua, 6; Wellington, 2; Nelson, 1; Canterbury, 2; Southland, 1. Due to the well-watered nature of the Westland terrain, a fire-engine has not been allocated to that conservancy, but instead two E.P.S. trailer fire-pump units have been purchased and delivered.

45. *Fire Districts.*—A total of 68 fire districts are now constituted, containing an aggregate area of 3,845,268 acres. Four new fire districts were constituted during the year; two for the protection of State Forests—viz., Great Barrier Fire District, 23,500 acres (closed season 16th October to 15th April (inclusive)), and West Taupo Fire District, 178,000 acres (closed season 1st October to 15th April); while two are for the protection of exotic forests owned by local authorities—viz., Waimakariri Fire District, 53,000 acres (closed season 1st November to 30th April), constituted upon the application of the Waimakariri River Trust, and Chaneys Fire District, 4,450 acres (closed season 1st November to 30th April), constituted upon the application of the Christchurch City Council. Two fire districts were amended—viz., Te Aroha - Katikati Fire District, which now contains 41,720 acres and protects State forests, and Puketitiri Fire District, 7,950 acres, protecting a scenic reserve and administered by the Lands and Survey Department.

Notable amongst the new fire districts is the West Taupo Fire District, which protects extensive timbered territory lying between the North Island Main Trunk Railway and Lake Taupo, and owned by the Crown and Maoris. This territory was the scene of a serious fire in 1937, and its protection has since been a matter of anxiety to Forest Service patrolling officers, owing to the increased fire menace through provision of easier access to the public and on account of increased sawmilling activities. The Maori owners are, however, beginning to take a more serious view of the danger of fire to their valuable timber assets, and with their co-operation and the enforcement of the forest fire district law and the Forest (Fire-prevention) Regulations 1940, as amended, the possibility of serious fire damage should be much reduced.

Fire districts are constituted under section 27 of the Forests Act, 1921–22, as amended by section 6, Forests Amendment Act, 1925, which provides that during any closed season it is unlawful for any person, save pursuant to the written permit of a Forest Officer, to set on fire or cause to be set on fire any timber (whether standing or not) or any undergrowth or any debris from forest operations or land-clearing operations, or any grass or other specially inflammable material, without taking such precautions as may be prescribed by a Forest Officer. The further obligations of sawmillers and occupiers of land in fire districts are set out in the Forest (Fire-prevention) Regulations 1940, as amended. Experience has proved that fire districts are extremely valuable in the protection of forests from fire, and their administration has proceeded smoothly with no evidence of hardship on settlers and others affected. This is no doubt due in a large measure to the close co-operation and understanding established between occupiers and Forest Officers concerned.

Under the present law a fire district may be established for the protection of a State forest without any limit as to the extent of the forest; in the case of other forest land, however, the area must exceed 200 acres and the fire district can be created only by application lodged by the owner or occupier. Difficulty is consequently presented in the establishment of a fire district for the protection of forest or scrub which may or may not contain timber trees, but which in the national interest should be preserved as protection forest, when the owners are either absent or indifferent, or where many small holdings are involved. Such areas are open to hunters and others and are repeatedly burned over through carelessness or intention, and it is desirable that such areas be given the protection of the

forest fire district law. To enable this to be done it will be necessary to amend the Forests Act, 1921–22, to give the Commissioner of State Forests power to constitute a fire district over such forest land without prior application by the owner or occupier, and to prescribe the method by which the district is to be administered—*e.g.*, by a committee of local residents—and how funds are to be provided to meet the cost of administration and fire-fighting. A particularly hazardous area of the type described above lies in the Taupo district. This menaces not only residential sites, but also established exotic forests, both State-owned and privately-owned, and in order to cope with the danger a voluntary committee, known as the Taupo and District Rural Fire Committee, has been set up. Expenses are defrayed from moneys contributed by the affected forest owners, but the committee has no statutory authority, and it is considered that greater security could be attained if the area were included in a fire district.

46. *Forest (Fire-prevention) Regulations 1940 (1940/246), as amended (1943/31).*—No amendment was made or found necessary during the year, and administrative experience discloses a much better knowledge and understanding than formerly of the laws relating to fire-prevention and control among users of State forests and occupiers, industrial operators, and other persons in fire districts. During the past fire season a greater measure of co-operation with Forest Officers in their administration of the regulations was evident, and only in isolated instances was ignorance displayed of the provisions of the regulations which require that any person in a State forest or in a fire district, in whatever capacity he may be, shall, on discovering or becoming aware of an outbreak of fire therein, take prompt steps to suppress such fire and shall forthwith arrange for the nearest Forest Officer to be advised, and shall then continue with all steps to suppress the fire until it is brought under control. An important feature of these requirements is that any person to whom they apply is required to observe them, whether he was responsible for the outbreak or not.

Some misunderstanding is, however, prevalent in regard to the application of Regulation 12, as amended in 1943 (1943/31), which provides that any person commits an offence who, without a permit from a Conservator or other Forest Officer, or without the permission of the owner or occupier, as the case may be, enters at any time any State forest, wherever situated, or any privately-owned exotic forest within a fire district or, being a permit-holder, fails to observe the conditions set out therein. The principal point of the regulation is that it applies to all State forests at any time and not only to those State forests in fire districts, as is believed in some quarters. It is necessary to emphasize that, in the interests of forest protection, legal proceedings must be taken against any person who is found to be in a State forest without a permit or who does not observe the conditions of a permit.

47. *Animal Damage.*—In spite of the large number of animals destroyed, considerable damage by deer, pigs, opossums, and goats continues in both indigenous and exotic forests. The destruction of deer has been greatly encouraged by the high price of skins—6s. 3d. per pound dry weight—and while the number recorded as being taken on State forest areas is smaller than last year, there is every reason to believe the actual number destroyed is higher than in that period. Damage by pigs to tree-roots continues; the increase in the number destroyed is due in part to the effects of meat rationing and prohibition of the sale of pork. Opossum damage has increased in most forest areas, but it is reported in one district that as a result of heavy trapping over recent years damage has been checked.

48. *Animals destroyed.*—The numbers of animals reported killed in State forests during the year are: rabbits and hares, 17,500 (8,300); deer, all species, 1,680 (1,945); pigs, 3,400 (655); goats, 187 (55); opossums, 3,226 (2,302).

49. *Insect Damage.*—The usual seasonal occurrences of *Sirex*, *Hylastes*, *Pachycotes*, and *Navomorpha* have been observed in all conservancies, but no serious outbreak of any insect pest has been reported.

At the request of the New Zealand Government, the Government of the Commonwealth of Australia amended the Customs (Prohibited Exports) Regulations by the introduction of Statutory Rules 1942, No. 479, which provide for the prohibition of the export from Australia to New Zealand of timber in the round, heart-in timber, sleepers, and any other timber free of heart with a cross-sectional area of not less than 60 square inches, unless the timber is branded with a Government mark or brand indicating, *inter alia*, that the timber has been examined and in the opinion of the examining officer is free from termite and other insect infestation and all termite galleries have been treated to ensure the destruction of insects. A certificate that all conditions have been complied with is issued by a responsible officer and accompanies the export documents. Shipments of hardwood timber are inspected at ports of discharge by officers of the State Forest Service or the State Advances Corporation, but no case of termite or other insect-infested timber impotred from Australia has been found since the regulations came into force on the 1st December, 1942.

50. *Damage by Fungi.*—No serious outbreaks of disease have occurred in indigenous or exotic State forests during the year. Damage by fungal attack reported from plantations, nurseries, and seasoning yards has in each case been investigated and kept under observation. The pathology of the chief forest species in the living tree and the timber in service is being studied. The following are among investigations in progress: rots of silver-beech, tawa, larch, &c., with particular attention to attack during seasoning; fungi responsible for decay of rimu, &c.; minor nursery losses at Waipoua and Waitangi Nurseries; in sections of air-raid shelters recently demolished in Wellington; stain and rot in insignis pine and tawa during seasoning and manufacture, including a greenish spotting of tawa heartwood, &c. Specimens from all regions have been received for identification, and herbarium specimens and typical cultures of many fungus species have been acquired.

51. *Damage from Natural Causes.*—The weather of the year under review, whatever its unpopularity with the public and with agricultural producers, has in nearly all districts been that of a true temperate forest climate highly favourable to forest growth. This does not mean that it has been wholly favourable to the artificial forestry operations that are necessary for the forest establishment phases of forestry work. Nursery and planting workers abhor unseasonable storms, and even seasonable snow and rain as much as does the farmer, and the year has been marked particularly by such storms in many districts and by less than the usual sunshine; but the established forest and the indigenous forest have suffered not at all, and the higher-than-average rainfall has not adversely affected forest growth, whilst it has markedly reduced the numbers of forest fires.

Canterbury nurseries in particular suffered from a wet spring, with consequently delayed seed-sowing, followed by unprecedented local hailstorms in early December, when the seed was in process of germination. Twice during the season such storms swept over the newly established forest nursery at Ashley, in North Canterbury, hail lying up to 4 in. deep on the ground after hours of storm. Newly germinated seedlings were broken beyond recovery, and most of the seed-beds had to be ploughed in. The same storms were so severe that the soft new growth on leading shoots of young conifers in planted areas were dented and pitted, and young foliage was torn off, but no visible disease incidence followed, and by the end of a wet and cold summer this damage has been completely repaired.

Earlier in the year winter snowfalls necessitated interruption of planting work at Golden Downs, in Nelson, a very rare occurrence in that forest.

Although no significant damage was suffered during the year by any State forest area, a violent storm in the late summer laid waste many acres of privately-owned plantations in northern Marlborough. The path of the storm could be clearly traced by the broken and levelled plantations on farm lands, and it was estimated that three-quarters of a million super feet of pine timber had to be sold for what it would fetch in the effort to clear up the sites quickly.

The district affected is not a forest district, but many amenity and shelter plantations have been laid out in it over the past seventy-five years. The damage that they suffered is typical of the occasional natural catastrophe that must be expected when forest growth is established in an area not naturally endowed with either forest soil or climate. The last similar occurrence in the same district was some sixteen years ago.

Abnormal dull, cold, rainy weather continued well on through the summer in most districts, and, after a brief respite, set in again early in the autumn. As a result, forest fire hazard was below normal, many grass districts normally very inflammable being too green to carry fires at any stage. The principal fires occurred early in the season in Southland and Westland, two districts which are usually those of lowest hazard, but which this year experienced spring and early summer weather better than elsewhere.

In Rotorua, where aerial patrol service was inaugurated through the co-operation of the Air Department, it was necessary to call for only seven such patrols throughout the season. This is probably the most conclusive evidence of the dampness of summer and autumn.

52. *Forest Offences.*—The number of convictions for offences against the Forests Act, 1921–22, and the Forest (Fire-prevention) Regulations 1940 secured during the year were 46 (40), in which the total fines, costs, and damages amounted to £622 (£476). Particulars of these offences appear in Appendix IX.

Included in the convictions are those of two defendants who unlawfully cut and removed timber not only from State forest, but also from Crown land. The Forest Service assisted in securing evidence and making assessment of the timber damage in the Crown forest—administered by the Lands and Survey Department—resulting in convictions (four in all) being secured in respect of both forests, with fines, costs, and damages amounting to £198 for the State forest offences and £482 for the others. In another case a second offender was fined £10 for entering the Kaingaroa Forest without a permit, while for not notifying fire danger or taking steps to suppress a fire a man was convicted and ordered to pay £58 costs and fire-fighting expenses. It is hoped that the penalties imposed and the reports of proceedings in the press will act as a deterrent to possible offenders.

CHAPTER VII.—FOREST ENGINEERING

53. *General.*—Shortage of suitable labour and equipment has again retarded progress with projected engineering works, although existing services have been maintained to a reasonable standard.

54. *Roads and Bridges.*—In addition to the maintenance of existing roads and bridges, new work has been carried out to assist in the development of exotic forests, as well as for maintenance of log production from indigenous State forests.

Operations under this heading are as follows: new roads formed, 27 miles 21 chains; roads maintained, over 800 miles; new tracks formed, 21 miles 33 chains; tracks maintained, 50 miles 31 chains; new culverts, 90; culverts repaired, 29; new bridges, 6; bridges repaired, 29.

55. *Construction Equipment.*—Some plant has, on account of age, been the cause of a number of stoppages, while in other cases the difficulties in procuring plant has delayed work.

Nevertheless, although some of the older plant is only kept in operation at considerable expense, the value of mechanical equipment, particularly for the maintenance of firebreaks, has again been clearly demonstrated. Two carryall scrapers and several tractors have been added to the construction equipment during the year (see para. 59).

56. *Buildings.*—The shortage of houses for married employees remains acute, and it has not been possible to provide more than temporary accommodation for additional staff. Routine maintenance and painting of existing buildings has been carried out in all regions, and a number of alterations and additions made.

Two camps which will form the nucleus for post-war activities have been built by defaulter labour, complete with cookhouses, stores, and other amenities.

Under the heading of miscellaneous buildings constructed, apart from these two camps, are 1 fire lookout cabin, 3 garages, 1 workshop, 1 cookhouse, 3 stores, 1 radio-telephone building, and 31 huts.

57. *Water-supply and Drainage.*—Wells in Kaingaroa Forest have been cleaned and additional storage provided at Rotochu Forest, while temporary water storage for fighting forest fires has been provided at Whakarewarewa and Balmoral. Now that mobile fire-fighting units have been made available, more extensive and permanent storage will be provided at an early date at suitable locations both at Kaingaroa and Balmoral.

58. *Utilization Plant.*—The production objective for the Waipa Sawmill set in last year's report at 11,000,000 board feet has been exceeded by 1,410,000 board feet, or 13 per cent. due largely to a novel but very successful operation of the plant made possible by the installation at the beginning

of 1944 of an additional high-speed log-frame. Since this installation the practice has been to edge all logs, excepting, of course, those sawn on the circular rig, in two-log frames, and to flitch the cants from both simultaneously if necessary, in the third. To apply this method with safety and efficiency, several minor changes were necessary in the roading, skid, and conveyer systems.

The additional power required by the mill and box factory over and above that available from the power-plant has been purchased from the Tourist Department, but a 200 kw. steam-driven alternator is being installed which, when in operation, will eliminate, or at least considerably reduce, the amount of power purchased; new feed-pumps to meet the increased power demand have been fitted to the boilers. The erection of a new 66 ft. dry kiln was almost completed by the end of the year, raising the total number to five and the annual drying capacity to 7,500,000 board feet.

The heavy demands made on the plant during the war years through overtime, pumice inclusions, and, in particular, lack of skilled maintenance at the most effective time have demanded attention and minor replacements. Such accretions of maintenance have now been attended to, and plant and equipment are in first-class condition, the power-plant being operated after ordinary working-hours under request from the local authority to assist in meeting the prevailing shortage of electricity.

59. *Transportation.*—Fifty-nine motor-vehicles purchased ex Army Department have been added to the Department's fleet of existing vehicles. These are to replace those which are no longer serviceable and to meet the extra demands for timber production and for general forest maintenance. Of the number purchased, 14 were placed in the Auckland Conservancy, 6 in Rotorua, 4 in Wellington, 2 in Nelson, 5 in Westland, 9 in Canterbury, and 19 in Southland.

Five tractors were purchased from the Armed Services and angle-dozer blades are being made and fitted. These machines have been allocated as follows: Rotorua, 2; Wellington, 1; Nelson, 1; Canterbury, 1. In addition, two carryall scrapers were purchased from the Public Works Department for use on construction and maintenance work in the Rotorua Conservancy.

To enable the increased output of sawn timber from the Waipa Mill to be handled, an additional end-lift truck has been obtained and is now in operation.

60. *Communications.*—The total length of telephone-line now erected is 444 miles, of which 157 miles are metallic circuit and 287 miles are earth-working circuit, while a total of 245 instruments are installed. No new line was erected during the period under review, but essential maintenance work was carried out. On the Kaingaroa system, 28 roadside telephone boxes have been installed at intervals throughout the forest for emergency purposes; in order to prevent the overloading of the system, each telephone is switched on to the line by the user when required and switched off again when not in use.

A considerable increase was made in the numbers of radio transmitter-receiver units in the Rotorua Conservancy to permit the extension of the existing system. Two of the major lookout stations have now been equipped with two-way radio telephone, while two other installations will be ready before the next fire season. Units have also been installed at Rotoehu and Waiotapu Forest headquarters, and at Wairapukao, Kaingaroa Forest. In addition, several units have also been procured for use in the exotic forests grouped around Tapanui (Southland Conservancy), where arrangements have been made for installations to be completed this year. All these sets are crystal-controlled for operation on the same frequency in the short-wave band.

In order to provide for two-way communication with the aircraft patrol in the Rotorua district, an additional short-wave transmitter has been installed at Kaingaroa. Satisfactory radio communication has been maintained between ground stations when required throughout the year, but signals from the aircraft are poor on occasions, due partly to the distances involved, and are often badly interfered with by other more powerful stations on the same frequency. Improvements in this respect are being sought.

61. *Community Planning.*—The necessity for providing suitable accommodation for married personnel is fundamental to the recruitment and maintenance of a highly competent staff, and, in connection with the Forest Service Training Centre at Rotorua, a contract has been let for the erection of six houses at Whakarewarewa. The logging schemes at Purcora (14 miles east of Mangapeehi) and at Te Whaiti (60 miles from Rotorua) both isolated localities with no amenities, require twelve and nine dwellings respectively, and arrangements for the building of these, together with the provision of community amenities, are now in hand. Surveys have also been made and areas defined for the establishment of two modern forest villages at the Kaingaroa Forest, one at headquarters and the other at Waimihia, some 30 miles to the south. All community planning is carried out in co-operation with the Housing Department, the assistance of whose officers is gratefully acknowledged.

CHAPTER VIII.—EXTRACTION AND COMMERCIAL DEVELOPMENT

62. *State Forest Block Sales and Permits.*—For sale purposes 168 timber appraisals (131) were carried out during the year, a total of 155,129,900 board feet (115,025,000 board feet) being appraised; 50 (32) of these appraisals, covering 42,757,700 board feet (25,115,000 board feet), were for other Departments or private owners. For the approximate estimation of timber quantities, twelve reconnaissances were made covering 16,598 acres (3,240 acres), with an estimated stand of 112,291,000 board feet (24,307,000 board feet) of timber.

Silver-pine resources in three areas in South Westland were investigated owing to the pressing need for railway-sleepers, and an examination made of 850 acres of beech forest in North Westland for the supply of mining timber. Two Head Office and thirteen Conservators' check appraisals were carried out.

The urgent demand for timber continues, and the amount of State forest indigenous timber sold was 104,017,510 board feet (86,200,900 board feet), the chief species being: rimu and miro 85,355,650 board feet, kahikatea 3,395,700 board feet, matai 2,819,500 board feet, totara 1,137,630 board feet, beech 7,873,800 board feet, tawa 2,050,000 board feet, and other species 1,385,230 board feet, of a total value of £141,467 (£116,177).

The total quantity of sawn indigenous timber produced from State forests by private sawmill operators was 107,735,000 board feet (106,711,400 board feet), including that from validated Warden's areas, while miscellaneous indigenous forest produce cut under permit comprised 306,632 posts and stakes (217,111), 6,302 stays (5,048), 16,826 strainers (14,658), 373,105 battens (113,793), 2,161 poles (773), 21,429 tram and rail sleepers (10,860), 8,591 house and pole blocks (10,690), 50,644 pieces of mining timber (120,637), and 791 cords of firewood (635½). The produce cut from exotic forests under permit comprised 131 poles, 45,000 pieces of mining timber (30,000), 100 rails, 2,000 battens, and 226 cords of firewood.

63. *State Forest Logs.*—Logging operations carried out by the State Forest Service in indigenous State forests produced a total quantity of logs containing 1,501,521 cubic feet (1,662,580), with a sale value of £57,008 (£69,485), a portion being sold for peeling purposes, while minor forest produce extracted at the same time comprised 268 posts (48,292), 194 strainers (270), 18,000 battens, 11 stays, and 131 cords of firewood (60). These operations were located in the Auckland and Rotorua Conservancies.

Logging operations carried out in exotic State forest produced 2,273,319 cubic feet (1,588,400), the major portion being the log-supplies for the Waipa Sawmill. A large quantity of minor produce was also extracted—viz., 23,523 posts (135,130), 1,132 poles (7,638), 1,180 rails (1,541), 2,200 droppers (11,825), 126,000 pit props (247,610), and 7,869 cords of firewood (6,184). In addition, 187,600 cubic feet (244,820) of round timber was obtained for creosoting, while 37 cords of peeled insignis pine were sold for woodwool manufacture.

64. *Indigenous Timber Disposal.*—The ever-increasing shortage of field staff over the war period has as last been arrested by the training of additional timber cruisers, as a result of which it is planned to keep ahead of millers' bush requirements by making timber sales on at least a two years' basis wherever sufficient supplies are available. Supplementary small and short-term sales will, of course, still be necessary in the case of adjoining areas not previously thought to be workable, but which millers subsequently find practicable to log in conjunction with their current operations.

The number of sawmills securing their log-supplies from State forest now stands at 117, equivalent to 26 per cent. of the total registered sawmills, or 40 per cent. of the registered sawmills cutting principally indigenous timbers. The quantity of sawn indigenous timber produced from State forest and Warden areas, amounting to 107,735,000 board feet, represents 31 per cent. of the total annual cut of all timbers and 40 per cent. of the indigenous timbers.

The results of this year's operations by a number of companies have brought to the forefront the general economic position of the timber industry, which, ever since 1936, has been under some form of price control. The result has been that, although the industry is receiving the undeniable benefit of a seller's market, nevertheless more and more units are reported as completing the year's operations in an unhealthy trading position. One of the causes of this appears to be the unavoidable time-lag which occurs between increases in operating costs and the translation of these increases to the selling-prices. Every such delay has made some inroad into the industry's margin. Other causes are the absorption into the industry of a proportion of inexperienced men, and the ever-increasing costs of materials used by the industry. These increases at the time of each impact may seem negligible, but cumulatively they appear to have had a significant effect on the operating margin enjoyed by the industry. The result of this general deterioration of the industry's economic position is that the normal incentives for progress and enterprise associated with a prosperous industry tend to be dampened. Under these circumstances no industry can be expected to give the best possible service to the community, and a survey is being made to ascertain the actual present economic position of the industry in order to decide what, if any, remedial action should be taken.

65. *Whakarewarewa State Forest Production.*—Logging operations on the Whakarewarewa State Forest were conducted throughout the year on an average forty-eight-hour-weekly basis.

The requirements of the Waipa Mill for saw-logs were again met largely by clear-felling of the older compartments planted to insignis pine, and to the extent that labour available made possible, by the thinning of compartments of other species, principally ponderosa pine, larch, and corsican pine. Thinnings unsuitable for sawing, due to size or form, were sold as mine props or stacked for seasoning preparatory to creosoting for fencing posts, &c.

The substantial increase in sawn-timber production by the Waipa Sawmill made necessary by wartime demand has resulted in the premature cutting-out of Block 22, one of the main stands of insignis pine in the Whakarewarewa Forest. To maintain current rate of cutting in the sawmill it will be necessary to supplement the Whakarewarewa supply of logs by clear-felling suitable areas in the north-western section of the Kaingaroa Forest, in which operations are scheduled to commence at an early date.

During the year a wage-incentive plan based on a 50–50 division of savings by reduced costs was inaugurated in the Whakarewarewa logging operations. The extra wages or bonus earned by those operatives who worked full time amounted to an average of £4 17s. 10d. per four-weekly period. Applied originally to only the main clear-felling group working in insignis pine, the scheme is now being extended to other groups. Logging-costs were reduced from 7s. 11d. to 6s. 9d. per 100 board feet.

66. *Waipa Milling Operations.*—In conformity with timber-control requirements, the Waipa Mill operated throughout the year on an average forty-eight-hour-weekly basis. The log-frames operated for 256 days and the circular rig for 247. The third frame installed during the previous year enabled the plant to reach a record output of 12,410,000 board feet (9,144,000 board feet), which represents 2·2 times the reported cut of the next largest mill in the country and 15 times the average production of all mills. The logs sawn at the plant comprised insignis pine (78 per cent.), ponderosa pine (8 per cent.), larch (4 per cent.), and other species (10 per cent.).

The circular rig concentrated on the cutting of the larger logs, with the result that 33 per cent. of its output was produced in widths exceeding 9 in. and only 26 per cent. below 6 in. In the log-frames, however, due to the large proportion of small logs dealt with, this position was reversed, and only 18 per cent. of the timber sawn was wider than 9 in. while 43 per cent. was under 6 in. in width.

As recorded last year, demand for containers was again sufficient to absorb the entire output of the sawmills, but 3,049,000 board feet of timber was sold to other manufacturers to meet the requirements of the Timber Controller.

At 31st March, 1945, Waipa stocks reached a record level of 3,076,000 board feet (1,740,000 board feet). This heavy increase in stocks on an acute seller's market arose primarily from the coal shortage and the inability of the New Zealand Railways to provide sufficient rolling-stock to move production. Full use was made of such emergency road transport as was available, and a total of 586,000 board feet was transported by road between 15th February and 31st March, 1945. Unfortunately, due to a serious shortage of truck-tires, approval for the use of road transport was withdrawn in April, and, as referred to elsewhere in paragraph 109, wood-consuming industries will face serious difficulties unless an improvement in the coal position allows rail transport to be made available for moving current production.

Timber filleted for kiln drying totalled 5,444,000 board feet and for air drying 3,366,000 board feet. The balance of 3,629,000 board feet was sold or used in a green condition. The dry kilns conditioned 5,683,000 board feet, of which 5,196,000 board feet consisted of green timber and 487,000 board feet partially air-seasoned. Kiln-drying costs amounted to 3s. 1d. per 100 board feet, as compared with 3s. 5d. last year.

The profit earned by the sawmill and dry kilns amounted to £20,090, as compared with £12,276 for last year.

A wage-incentive scheme of the co-operative bonus-fund type similar to that adopted for the Whakarewarewa logging operations was also introduced at the Waipa Sawmill, but, due to the wide diversity of trades involved, it was by mutual consent abandoned after eight months' trial.

67. *Waipa Box-factory and Planing-mill.*—As in the case of the sawmill, the box-factory operated on an average forty-eight-hour-weekly basis, but during the latter half of the year additional overtime was worked continuously.

Box-factory manufacture was maintained at a high level throughout the year, a gross total of 7,645,000 board feet (7,763,000 board feet) being converted into box shooks. Practically the whole production was absorbed for the export of foodstuffs, clothing, and munitions.

Despite this large production of shooks, complaints were received on a number of occasions that the packing of foods was held up due to a shortage of containers, but almost invariably the shortage could be traced to an inadequate supply of rail trucks, though to some extent it was due basically to acute demand preventing the building-up of reasonable stocks at consuming points.

The box-factory operations showed a profit of £20,596 for the period, as compared with £15,384 for the previous year.

68. *Departmental Wood-preserving Activities.*—A satisfactory output was obtained from all three creosoting plants, the total volume of produce treated being 20 per cent. greater than for last year, but at Waipa insufficient labour was available for cutting poles and posts to maintain seasoning yard stocks at a satisfactory level, and a reduction in output, particularly of posts, will result in the coming year. A continued demand for creosoted posts from Waipa still exists, and fulfilment of all orders has not been possible due largely to lack of railway wagons. Treatment at Hanmer was confined almost entirely to poles, while at Conical Hills mainly fencing material for departmental use was treated. A pole-gaining-and-boring machine, made at the Waipa Mill workshop, was brought into successful use at Waipa and has considerably increased the rate at which gaining and boring operations can be carried out.

Current retail prices of creosoted posts and strainers, f.o.r. Rotorua, are as follows:—

Size I posts, 6 ft. 6 in. long, 4 in. to 6 in. top diameter ..	.. £17 7s. per 100.
Size II posts, 6 ft. 6 in. long, 3 in. to 4½ in. top diameter	.. £12 10s. per 100.
Strainers, 8ft. 0 in. long, 8 in. to 9½ in. top diameter ..	.. 15s. 6d. each.

69. *Exotic Forest Exploitation.*—Due to the continued acuteness of the man-power shortage in the industry and the necessity for maintaining existing indigenous mills in production in preference to opening up new exotic units, anticipated developments in the milling of exotics have been seriously delayed. Advantage has been taken of this position to send two senior officers to North America and Europe, both to study the latest logging and milling practices and to inquire into the possibility of securing British-made equipment for all types of mills. Reports of their investigations will be published soon after their return. Unexpectedly, it is gathered from their correspondence that log-frame sawing is finding a much wider field of use even in North America than had been anticipated, and that log-frames of the Northern European type similar to those operating so successfully at Waipa are being used in conjunction with band resaws for custom sawing in substitution for Pacific carriage and bandsaw breakdown rigs. Far-reaching improvements in Swedish log-frame-mill design and operation making it much more practicable and economic to work one-frame mills are also reported.

Prominent users of insignis pine both in Australia and New Zealand continue to volunteer their conviction based upon the use of frame-sawn timber and inspection of log-frame operations at Waipa that this type of sawing should be encouraged and developed in the long-term interests of the industry.

CHAPTER IX.—TIMBER TRADE

70. *Production of Sawn Timber.*—Under the Sawmill Registration Regulations 1942, 452 (447) sawmills were registered for the year ended 31st March, 1945, a list of those registered as at 31st August, 1944, being published in *Gazette*, 1944, page 1241.

The latest statistics available from the Government Statistician (see Appendix VII) show that the production of sawn timber for the year ended 31st March, 1944, totalled 351,000,000 board feet (342,000,000 board feet), representing the highest cut recorded since 1926, when 353,000,000 board feet was reported. Considering that the sawmilling industry has been working under numerous handicaps—viz., shortage of man-power, lack of equipment and supplies, frequent breakdowns due to the difficulty of renewing plant, &c.—this figure must be considered a very creditable achievement. From current sawmill registration returns it would appear that the annual cut for the year ended 31st March, 1945, will be only 341,000,000 board feet, this recession being the result of the acute man-power shortage at the beginning of the period under review. Although the man-power position has

since improved, another 180 are urgently required in order to maintain the current rates of production estimated at 350,000,000 board feet, and still another 800 to increase production to a planned objective of 380,000,000 board feet for the year ended 31st March, 1946.

71. *Species Cut.*—Although the total current production of timber has not been exceeded for eighteen years, there has been a steady decrease in the cut of most indigenous timbers and a corresponding increase in the output of insignis pine.

Rimu and miro production has declined from 208,000,000 board feet to 191,000,000 board feet since the year ended 31st March, 1940, whilst kahikatea cut has fallen from 33,000,000 board feet to 21,000,000 board feet during the same period. Although the output of kauri has for some years been falling steadily until it reached in 1942–43 the low level of 2,500,000 board feet, there was a very urgent demand in 1943–44 for timber for the construction of minesweepers, tow-boats, barges, &c., for the Allied Navies, and the production of kauri had to be expanded to 4,500,000 board feet in order to meet these requirements. The only indigenous timbers which have recorded increases have been beech, tawa, and other hardwoods, whose aggregate production has increased by 6,000,000 board feet. In pre-war years the use of native hardwoods was strictly limited, but the fact that oak and other imported hardwoods are no longer available has led to an improved demand for the local species.

Exotic species, principally insignis pine, continue to be cut in increasing quantities, and the recorded total of 83,000,000 board feet creates a new peak in production, representing an increase of 36,000,000 board feet over the reported cut for the year ended 31st March, 1940. The Auckland Province contributed 23,000,000 board feet of this increase, reflecting the expansion in milling of small-sized plantation timber in the Rotorua - Putaruru - Bay of Plenty districts.

72. *Man-power.*—Realizing that increased timber production was primarily dependent on man-power, and particularly additional skilled bushmen, efforts to locate suitable men and to secure their transfer to the industry were carried on incessantly throughout the year by both the National Service Department and the State Forest Service. Such efforts were well rewarded, but, unfortunately, the gains in man-power were offset by the unavoidable loss of a not inconsiderable number of men who had to leave the industry for various reasons, many of them being skilled workers who have continued to work as long as practicable after their normal retiring-age to assist over the war period. In contrast, few of the men gained to the industry were skilled personnel, with the result that the ability of the average employee has tended to fall, though, it is hoped, only temporarily. All millers who have employed the unskilled workers and undertaken their training must be highly complimented on their willingness to assist the national interest in this way.

Practically all mills are seriously understaffed in their logging activities, and the shortage of skilled bushmen has become very acute. Retirement of older bushmen and the lack of young men training to replace them has brought about a difficult position that can only be overcome by giving the maximum possible encouragement to any one who can be persuaded to enter this field of employment. It is certain that all efforts to increase production by assisting in development work, provision of equipment, and erection of new mills will be largely nullified unless bushmen can be found or trained to provide ample log-supplies.

Tuition in sawdoctoring at the Waipa Mill has been continued and the trained men absorbed into the industry, but some difficulty is being experienced in maintaining the interest of the industry in this training scheme.

Additional reference to the man-power position will be found in paragraph 102.

73. *Equipment for Timber and Allied Industries.*—Throughout the year deliveries of new equipment have been very limited, and sawmillers and boxmakers have had to tax their resources to the utmost to maintain plant in reasonable working-order. Naturally repairs to old plant seriously retard production, and this is particularly noticeable in the case of old logging equipment, frequent repairs to which result in many mills being short of logs.

A few heavy tractors have arrived in the country and been allocated to suitable operators by the Mechanical Plant Advisory Committee, but there are still a number of sawmillers whose requirements have yet to be met. Assistance in developmental work has been given to a number of sawmillers by the hire of tractors from the Public Works Department whereby production has often been maintained where it would have ceased altogether if such plant had not been made available. A number of heavy motor-vehicles have been released by War Assets Realization Board and allocated in most cases to replace worn-out trucks.

The service given by the Timber Controller's Office in locating machinery, tractor, and truck spares and other materials has been continued, and with the close co-operation of other Departments, mainly the Public Works Department and the Army Department, it has been possible to keep most tractors and vehicles in commission.

74. *Domestic Markets.*—A strong seller's market characterized every section of the timber trade throughout the Dominion. A careful watch was maintained over grading practices, but, generally speaking, sales were fairly up to specification. As in previous years, the timber shortage in the North Island was much more acute than in the South Island, which again benefited from increased supplies as a result of the lack of shipping facilities for moving West Coast timber either to the North Island or to Australia. Due to a shortage of both rail and road transport in the North Island, the year closed with larger mill stocks than at any time for several years.

In the building section of the North Island trade, shortage in supply has shifted gradually during the year from the finishing and dressing grades to scantling timber. This disparity in supply was not so marked in the South Island. As the result of a break in overseas contracts for foodstuffs, supplies of insignis pine, originally allocated for boxmaking, were released over a short period for building purposes in both Islands.

Despite the increased production of insignis pine, supplies of this timber and of white-pine proved quite inadequate for the greatly expanded requirements of the box industry for the packing of foodstuffs and munitions. Although considerable quantities of sap rimu for butter-boxes, &c., and of sap matai for cheese-crates and tallow-casks were absorbed along with minor quantities of other indigenous timbers, the stock position in box-factory yards deteriorated so badly that many North Island box requirements had to be met with shooks manufactured in the South Island.

Following on legislation extending annual holidays in the timber industry, wholesale timber and box prices were advanced slightly to cover the extra costs involved, representing the first increase in timber prices since 1942. Pending the supply of financial accounts from timber-merchants to determine whether they could absorb these increased costs, the Price Tribunal did not approve of a revision in retail prices, which therefore remained unchanged throughout the year.

75. *Timber Imports.*—As disclosed by Appendix IV, imports for the calendar year 1944 amounted to 15,178,000 board feet, consisting almost entirely of Australian hardwoods and North American softwoods in virtually the same quantities as for the previous year. Pre-war timber imports averaged 40,000,000 board feet annually, and, as most were considered essential, the decrease in supply has been felt keenly, and wood-users have suffered considerable hardship.

The supply of Australian hardwoods, particularly for railway-track sleepers, fell to such a low level during the year that officers of both the New Zealand Railways and the State Forest Service were despatched to Australia for the purpose of surveying the forward position and negotiating improved arrangements with the Commonwealth Timber Controller. Their investigations showed that a very critical position existed in the Commonwealth, and that shortages of man-power, as in New Zealand, were limiting production. Assurances were received that all assistance possible would be forthcoming, and while improvement in supply did follow, local stocks of Australian hardwood sleepers fell to such low levels that it was found necessary to resort to the use of totara for tangent work in order to conserve hardwoods for curve and other critical uses. As the demand for totara has exceeded production for many years, its use for railway sleepers is a serious blow to the building industry, particularly for joinery, and it is to be hoped that during the current year it will be possible to secure such an improvement in the supply of hardwood sleepers as will permit the use of totara to be discontinued.

76. *Timber Exports.*—From the beginning of the century until 1925 exports of timber exceeded imports, but ever since, with the exception of a brief period during the depression, imports have consistently exceeded exports. For the calendar year 1944 exports totalled only 4,243,000 board feet—the lowest figure recorded since 1880—but this figure would have been substantially greater had shipping been available, as 12,000,000 board feet of rimu and 1,000,000 board feet of beech had been allocated to the Commonwealth Timber Controller in exchange for essential supplies of Australian hardwoods, for sleepers, poles, piles, and other purposes (see Appendix V).

CHAPTER X.—UTILIZATION TECHNOLOGY

77. *General.*—It has been necessary during the past year to subordinate long-term objectives to a considerable extent, to the immediate problems relating to wartime timber usage. Such problems have ranged from container design to the employment of special plywood for an active role in warfare; routine inspectional work continues to be a necessary corollary.

78. *Grading of Timber.*—In connection with the major housing-construction programme for the post-war period it has become more apparent during the year that timber requirements should be met as far as practicable by the use of insignis pine for structural purposes as well as for sarking and flooring. Substantial progress in the development of grading rules to cover framing timbers has been made; trial cuttings of sample areas of young exotic forest of *P. radiata* have yielded invaluable information on sawing and drying problems, in addition to providing material upon which to formulate practicable grading rules. As a basis for these rules it has been necessary to introduce the conception of "cuttings"—*i.e.*, the standard length building members obtainable from random length timber, which is thus graded according to its ability to produce such cuttings. For "cuttings" to be used as studs in non-bearing walls or for members not subjected directly to either bending or compressive stresses, 50 per cent. of any cross-section free from defects—*i.e.*, knots principally—has been regarded as the acceptable minimum. For those to be used for rafters, ceiling-joists, and studs for exterior or load-bearing walls all of which are subjected primarily to bending and tension stresses, at least two-thirds of any cross-section must be free from defects. Sufficient data have now been assembled to specify grades for kiln-dried framing timber for the prefabrication of wall panels.

A survey made in Auckland during the current year of the seasoning, storage, and utilization of tawa has provided additional data prerequisite to the finalizing of grading rules for hardwoods.

79. *Specifications for Finished Products.*—Following several years' investigations, recommendations made by the Forest Service for standardizing sizes and profiles of dressed building lines were considered by a Standards Institute Committee which agreed to the more important provisions affecting types and size of weatherboarding in 6 in. nominal width, and the profile and finished dimensions for nominal $\frac{1}{2}$ in. matchlining. Although the provisions for flooring in 4 in. and 6 in. nominal width were approved as regards width and profile, the required finished thickness was raised to $\frac{13}{16}$ in., with the proviso that dressing on the back is not essential, but the proposal is so impracticable and so opposed to all technical considerations that it is unlikely to be proceeded with. Weatherboarding from nominal widths above 6 in., matchlining in nominal $\frac{5}{8}$ in. and $\frac{3}{8}$ in. thickness, and secret-nailed flooring have meanwhile been excluded from the proposals.

Schedules of permissible blemishes and defects for furniture parts and general clauses affecting timber sizes, seasoning, and species were prepared by the Forest Service for embodying in a household furniture specification, and at subsequent meetings of the Standards Institute Furniture Committee most of these clauses were adopted. Those sections of the specification dealing with finished timber sizes, finished moisture contents, and treatment of timbers such as tawa for dowels and finished work to ensure freedom from attack by insect borers require fuller consideration by the Timber Sectional Committee. In the draft standard for commercial plywood the clauses governing grade names, grain direction, face checks, core gaps, finished moisture content, and adhesive strength are considered most unsatisfactory, and their revision is considered essential in the interest of consumers.

Other current Standards Institute Committee work covered timbers for tool-handles and ladders. During the year the regulations covering wooden casing and capping for electrical installations have been reconsidered, and clauses covering grade, moisture content, and other details amended.

80. *Structural Utilization.*—In co-operation with the Housing Department, several housing construction trials were carried out with insignis-pine framing-timber, as a result of which several important conclusions have been reached:—

(*a*) The kiln-drying of insignis-pine framing grades is regarded as necessary and has been shown to be practicable; it is essential that the practice of exposing the dry framing to rain-wetting and contact with wet ground on the housing site (as customarily done with rimu) be eliminated. Both requirements follow from the susceptibility to decay of non-heart insignis pine produced from young rapidly grown trees either before or after kiln drying if freely exposed to rain or moisture:

(*b*) Insignis-pine framing actually treated to resist decay may equally be said to require kiln-drying both before and after treatment, and also covered storage on the housing-site:

(*c*) On "standard" construction jobs covered storage is generally unavailable, while there is also ample opportunity during erection for rain-wetting to occur *in situ*; by prefabrication methods it is more feasible to avoid wetting of the dry timber and the period of exposure during erection of panels is characteristically short.

81. *Mill Studies.*—A circular sawing study was made of Kaingaroa insignis-pine logs ranging from 6 in. to 17 in. in small-end diameter (inside bark). The average of 83 logs gave a diameter of 8·96 in., length 13·4 ft., volume 7·88 cub. ft., and taper 0·167 in. per foot. Small mill studies were also carried out with silver-beech in Southland and with flangy-butted white-pine on the West Coast.

82. *Utilization of Minor Timbers.*—Minor indigenous woods have been receiving attention for violins (rewarewa), smokers' pipes (rata), ornaments (fuchsia), wood for use in transformers (tanekaha), wooden wringer bearings (black maire), furniture (tawa, rewarewa, taraire), &c. Locally grown eucalypts, though not the equal of the Australian timber, have filled a useful function in replacement of imported woods for agricultural machinery and other products subject to hard wear; the good properties of locally grown ash (handles and agricultural machinery), macrocarpa (building construction), chestnut and plane (decorative work) are beginning to be more widely recognized. Kaikawaka has been used in small quantities for boat-building, joinery, &c., on the West Coast.

83. *Timber Mechanics.*—Physical and mechanical tests on both green and air-dry insignis pine from trees planted at 6 ft. by 6 ft. spacing in 1915 on Whakarewarewa State Forest are now complete, and some of the more important properties of this material are listed below in comparison with results obtained from the United States of America tests on virgin ponderosa pine. It must be emphasized, however, that these results apply in both cases to small clear specimens free of all defect and that the average grade and utility of the locally grown insignis pine is very much lower than that of the virgin grown ponderosa pine in which defects such as knots, &c., are very much smaller and infrequent. Only by pruning and the adoption of long rotations of, say, fifty to seventy years may timber of comparable quality be grown:—

	Insignis Pine, Whakarewarewa Forest.	Ponderosa Pine, U.S.A.
Trees tested	5	26
Rings per inch	2·75	19
Specific gravity (weight oven-dry, volume green)	0·390	0·38
Static Bending—		
Modulus of rupture (pounds per square inch)—		
Green	5,870	5,000
Air dry (12 per cent. moisture content)	11,230	9,200
Modulus of elasticity (pounds per square inch)—		
Green	1,059,000	970,000
Air dry (12 per cent. moisture content)	1,338,000	1,260,000
Compression parallel to grain—		
Maximum crushing strength (pounds per square inch)—		
Green	2,590	2,400
Air dry (12 per cent. moisture content)	5,570	5,270
Shearing strength parallel to grain (pounds per square inch)—		
Green	870	680
Air dry (12 per cent. moisture content)	1,550	1,160

Timber from coconut-palms provides a useful constructional material in Rarotonga, and strength tests made on behalf of the Works Department on sticks cut from green material showed modulus of rupture values from 13,700 lb. to 4,980 lb. per square inch and maximum crushing-strength values from 8,000 lb. to 2,000 lb. per square inch.

In addition to routine tests of casein-bonded and liquid resin-bonded plywoods, shear tests were made on small experimental batches bonded with film glues. While the test figures on these batches were scarcely equal to those obtained in wet and dry tests of factory batches glued with liquid resin, they were regarded as reasonably satisfactory. Wider experience of the peculiarities of indigenous woods, with particular regard to the optimum moisture content and temperature for curing the glue bond, is necessary if better results are to be attained.

84. *Box-testing.*—Fibre-board butter-boxes of various types have been subjected to comprehensive tests in the drum-tumbler machine and by the drop-corner method. While corrugated fibre-board boxes of the dump type—that is, without any wooden end reinforcement—suffered considerable distortion without bursting, tearing of the interior parchment was serious and exposed the butter to direct contact with the kraft fibre, with consequential risk of tainting. The tests have shown that the standard carton with taped centre joints, top and bottom, is the most satisfactory design of dump case. The sleeve and slide variety of dump case did not prove nearly as efficient or strong. The "Saranac," or wirebound, type of box with wooden ends and corrugated fibre-board mat did not prove anything like as efficient as those with solid fibre-board mat which have the highest reuse value and are therefore

the most suitable for the export trade; this type of container proved to have excellent strength, but the tests indicate that, whereas the dump-type containers require only a good grade of kraft tape for closing the joints, the "Saranac" require to be closed, although at only one joint, with the much more expensive and efficient cellulose acetate tape. For both the corrugated and solid fibre-board a waxed inner lining or ply has been found necessary to minimize tainting, particularly when moisture condenses thereon as a result of defrosting. The outer liner or ply should be similarly treated, although a specially treated hardened surface in order to resist scuffing is the prime essential. Testing methods are being revised to meet the special characteristics of fibre-board containers.

As a result of service inspections and observations, various containers have been redesigned. A revision is in progress of boxes used for large and small fruits, and, in conjunction with the Fruit Case Committee of the Horticultural Division, Department of Agriculture, fuller specifications are being drawn up for all cases whose retention is merited.

85. *Wood Technology.*—In anticipation of some of the valuable decorative woods of the Pacific Islands becoming available post-war for furniture and similar purposes, work has been continued on the identification and classification of collected specimens. The assistance of the late Professor Samuel J. Record, Yale School of Forestry, with the first collection of woods made by an officer of the Forest Service last year was invaluable. Subsequent collections by R.N.Z.A.F. personnel have resulted in some excellent material being made available for further study. The Botany Division, Department of Scientific and Industrial Research, has assisted in the identification where fruits (or flowers) and foliage have been supplied in addition to wood. This Service is in turn co-operating with the Botany Division in a number of investigations in which wood microstructure provides useful evidence.

Routine identifications of nearly fifty specimens for trade and other interests have covered a wide range of indigenous and exotic timbers grown in New Zealand, and a number of imported woods. An extensive collection of woods and microslides made by Professor H. B. Kirk over a long period of years has been handed over to the Forest Service, and constitutes a valuable addition to the departmental collection; the action of Professor Kirk and the Victoria University College is much appreciated.

Specific gravity and shrinkage studies of material obtained in sample plot investigations and assessment line surveys of various exotic forests have been continued in addition to the standard tests made in conjunction with the mechanical testing programme (see para. 83). Analysis of tests on insignis pine from Golden Downs State Forest have disclosed the occurrence as in that from Kaingaroa State Forest of a zone of wood close to the pith having an abnormally large longitudinal shrinkage particularly in the butt log and which it appears is largely responsible for the excessive twist that has been experienced both in Australia and New Zealand in the utilization of insignis-pine timber produced from very young rapidly-grown trees.

Tests of Solomon Island woods have so far covered only a small number of species which fall principally into the medium-weight and light-weight groups (specific gravity 0·280 to 0·535 based on weight oven dry and volume green). One very desirable character of several of the more important tropical woods commonly preferred in the Northern Hemisphere for cabinet-making and veneering is a small difference between radial and tangential shrinkage; this property has been found in some of the woods from the Solomon Islands.

86. *The Drying of Timber.*—A specification covering the practice of kiln drying and limiting usage of the term "kiln dried" to a product which may be used with full confidence has been prepared for the Standards Institute as a basis for discussion by the Timber Sectional Committee. The need for such a specification has been further emphasized during the current year in the formulation of specifications for manufactured wood products wherein stated moisture contents have been required. A few instances of disregard for the quality of the kiln dried product, either through ignorance of or inattention to the basic principles of kiln drying on the part of kiln-owners, have also shown the need for such a specification; it will serve the dual purpose of guidance to kiln-owners and protection to users. In addition to the factors of stack width, width of side flues, and the conditioning period after removal from the kiln which were referred to in the last annual report, it must be emphasized that successful kiln drying is dependent upon careful choice, preparation, and regular weighings of the kiln samples.

As part of the use study of insignis pine for house framing, a number of drying schedules were tested on kiln charges of the young exotic forest timber secured from Kaingaroa State Forest (see para. 78). The first charge of 2 in. stock dried at a constant temperature of 140° F. and a constant relative humidity of 70 per cent. demonstrated that distortion of scantling grades could be partially avoided, but that drying below 18 per cent. to 20 per cent. moisture content accentuated the tendency to warp in pieces containing the wide-ringed wood surrounding the pith. Later charges were dried in a very much shorter time on more severe schedules one using a dry bulb (D.B.) temperature of 160° F. with relative humidity decreasing from 62 per cent. to 46 per cent., another using D.B. 145° F. and relative humidity decreasing from 55 per cent. to 48 per cent., the final one 170 °F. (D.B.) and 60 per cent. relative humidity throughout. Of these three schedules the third gave slightly faster drying (121 hours) as compared with the first and second (130 hours), but a constant temperature schedule using 160° F. and 60 per cent. relative humidity approaches more closely to the optimum for scantling-grade timber. Optimum drying conditions for other grades of insignis pine have also been established at the Waipa plant.

Inspections of several kiln installations were made during the year, and assistance given to operators including the supplying of schedules for insignis-pine corestock and other grades for resawing, for Californian redwood, tawa, and the common New Zealand building timbers. It should be specifically noted that segregation of "black heart" tawa is desirable, as this refractory wood requires lower temperatures and slower drying than the tawa free from "black heart."

87. *Wood Preservation.*—With the expansion of house-building activities, there has been considerable interest in the preservative treatment of non-heart indigenous timbers, particularly for flooring and weatherboarding and of exotic pine timbers for scantlings. A special committee of the Standards Institute which was set up to consider the formulation of an appropriate specification covering the

quality and application of wood preservatives to building timber has met on several occasions, and it is hoped that a standard specification will soon be issued. Pentachlorphenol continues to rank as the most toxic preservative generally available for such work.

Unfortunately, it is not yet appreciated that, irrespective of the preservative employed and whether pressure or non-pressure application is used, timber must be adequately seasoned before treatment. The reason for this is twofold. Firstly, removal of free water from the cells of the wood is necessary in order to enable adequate absorption and uniformly deep penetration of the preservative to be achieved—with green timber difficulty is likely to be encountered in obtaining the necessary absorption and the penetration is almost certain to be erratic; and, secondly, it is important that the checking and splitting, however minute, which invariably accompanies the shrinkage during seasoning should occur before treatment, so that the preservative can enter such crevices and give protection against the subsequent entry of decay or insects at such points. Failure to observe this fundamental precaution of drying timber before treatment can completely nullify the value of any treatment or preservative.

Neither are the natural limitations of the various classes of preservatives well recognized. Creosotes and carbolineums which may be grouped as coal-tar derivatives are outstanding in that over the last century they have been used for the treatment of twenty times as much wood as all the other known preservatives combined and currently are still used ten times as much. Their value lies in the fact that they are highly toxic and relatively permanent, resisting leaching by rain, ground or sea water, and also improve the mechanical surface properties of the wood and its dimensional stability. The only serious disadvantages to the use of creosotes, &c., are their lasting odour and their ability to penetrate all ordinary paint films (with the possible exception of aluminium primer) and so discolour any light paints applied over the treated wood. For these reasons the creosotes find their principal usage in poles, sleepers, piles, and all outdoor or exposed construction and are confined in building work to piles and subfloor structures. No other preservatives, advertisements and propaganda to the contrary notwithstanding, are their equal, especially in such a country as New Zealand with a high and well distributed rainfall.

Ranking next in value and wide utility are the oil-solvent preservatives, of which pentachlorphenol is the most important. These have much the same properties as the creosotes in being highly toxic, relatively permanent, and not affecting the dimensional stability of the wood. On the other hand, they do not improve the mechanical surface properties of the wood, but leave no lasting odour and do not discolour paint films or varnishes. Their natural field of usefulness is accordingly the treatment of wood *in situ*, assembled wooden articles, and particularly of finished furniture or joinery parts prior to final assembly and of precut building members for prefabrication or house site usage.

The water-soluble salts, of which zinc chloride has been the most widely used, include a much greater range of proprietary preservatives than either of the other groups. Many of the claims made for such preservatives should be accepted only with caution. That some of them are quite toxic is certain—some even dangerously so, such as the arsenical and mercurial salts—but, aside from the advantage that they do not discolour paints and varnishes, the disadvantages attached to their use severely restrict their utility. Applied as they must be to dried timber, the wood swells again as the preservative penetrates the timber. Moreover, after treatment the wood must be dried again (a further expense), but, unfortunately, it does not shrink back to its original dimensions, so that this class of preservative cannot be used either for assembled wood products or for accurately finished furniture or joinery parts, but only for precut building members or parts not requiring great accuracy of fit. If good penetration can be secured, this class of preservative, like both other groups, may be applied before machining, working, or finishing, and any untreated wood exposed by subsequent working, &c., retreated. Water-soluble preservatives, however, do not resist leaching—their name implying this—to the same extent as the other groups, though some such preservatives are reported to be relatively good as compared with others and have their claims supported to a certain degree by laboratory and service tests. Nevertheless, until further service data are available, particularly from countries of high, well-distributed rainfall, extreme caution should be used in employing any water-soluble salts except for the treatment of timber entirely protected from rain and ground water, &c. They are therefore not recommended for posts, poles, sleepers, piles, &c.

Attention is drawn to a demonstration of the effectiveness of creosote as a preservative for rimu poles. In 1931–32, sixty-five poles treated with creosote by the hot-and-cold bath process and with varying absorptions were installed by the Post and Telegraph Department in the Christchurch, Timaru, and Greymouth districts. Since installation, annual inspections have been made, the result of the last being that, after twelve to thirteen years' service, sixty-three of the poles are still sound and free from decay. In only two of the poles, which are still serviceable, was any decay discernible, and this occurred in poles which had received only a light treatment. Untreated rimu poles installed at the same time required renewal or strengthening with pole butts after only two to four years. An average life of not less than twenty years is confidently expected from these treated poles, and the results so far obtained are a valuable indication, not unexpected, of the feasibility of substituting locally grown timber, properly creosoted, for at least a portion of the country's imported Australian hardwood requirements.

In 1943 a test was initiated in co-operation with the Auckland Harbour Board to determine the resistance to marine borer attack of creosoted exotic timbers and untreated indigenous timbers. A recent inspection indicated that nearly all of the creosoted specimens are free from attack, although slight damage had occurred in a few which had received only a light treatment with shallow penetration of creosote. Untreated control specimens of the same species all showed heavy attack. Of the indigenous untreated timbers under test, totara is the only species which has exhibited any marked resistance, attack being only slight. Specimens of taraire, tawa, miro, and kauri all showed heavy attack, with taraire appearing to have suffered the least.

88. *The Painting of Wood.*—The Inter-Departmental Paint Committee has been actively engaged in seeking solutions to long-standing painting problems and in standardizing methods for judging the quality of paint coats. The panels erected by the Forest Service on its test fence at Wallaceville are beginning to show slight deterioration of the paint coat due partly to rain-spotting occurring soon after application of the top coat; minute checks and "crowsfoot" are present in a few panels, and chalking is also commencing. It is as yet too early to make comparisons according to types of priming coats applied. Two of the specific features affecting painting of insignis pine—growth rings on flat-sawn boards and resin pockets—are beginning to show through in occasional boards.

One approach to the problem of priming totara is suggested by the crystals which are readily apparent on the surface of the dry timber; with the high temperatures used for kiln drying totara this crystalline material volatilizes and is redeposited on the cooler surfaces around the kiln doors. Some of these deposits are being collected for experimental work by the Paint Committee.

89. *Plywood Manufacture.*—A technical officer of the Forest Service was maintained for some months at one of the new plywood-factories in order to study the utility of the indigenous species for rotary veneer and plywood production, the objective being to formulate practicable log grading rules for peeling material. Measurements of cubic content, recording of all visible defects, misshape, taper, spiral grain, &c., and re-examination after cross-cutting into bolts have been necessary in this study which has now covered 71 logs and 247 peeler bolts obtained therefrom. Species studied included rimu (27 logs), matai (25), tawa (10), miro (5), and taraire (2).

The incidence of defects upon the conversion of logs into rotary peeled veneers is an important subsidiary study from which useful figures are being obtained. Inherent losses due to taper, core, &c., alone have been found to amount to 20 per cent., and the study is being continued in order to determine manufacturing losses and how these can most readily be minimized. Of the 247 peeler bolts examined for grading, 146 bolts have been used in the conversion study. In the case of hardwood bolts, especially tawa and taraire, the losses in conversion are unduly high on account of excessive "shake" development; log end coatings capable of retaining their integrity in the preparatory hot-water-vat treatment are required.

In drying little trouble is experienced with matai and tawa, but rimu veneers require more adequate control of drying conditions than is provided in most veneer driers. Moisture-content control in veneers prior to assembly has been shown to be much more essential in resin-glue bonding than with casein-gluing. It may be accepted as axiomatic that close technical supervision of glue-mixing, glue-spreading, and pressing schedules, coupled with regular tests for shear strength of the finished plywood, is essential to maintenance of quality, but no less important is the necessity for waste reduction in veneer production and usage. Wastage occurs as the result both of protracted storage of peeler logs without the protection of end-coatings, and of incorrect preparatory hot-water treatment of peeler bolts as well as through wasteful peeling of veneers and subsequent carelessness in both handling and clipping. Technical control of drying and conditioning prior to assembly are equally vital to waste reduction, but the most significant conclusion is that the basic cause of high wastage is the generally poor quality of peeler logs, and it is a tribute to the technique of departmental log grading that every purchaser of peelers from Forest Service logging operations reports them to be par excellence, so much so that one manufacturer reported that if his factory could secure its whole supply in comparable quality logs, costs could be so reduced as to allow of a substantial reduction in selling-prices for its finished products.

90. *Pulp and Paper Production.*—The development of the pulp and paper industry in New Zealand on sound lines was brought a stage nearer as a result of the report which was presented by the Government's technical adviser from England. The recommendations contained in the report have been the subject of close scrutiny by the Organization for National Development. The logical step which should next be taken is a full mill-scale demonstration in co-operation with consumer interests of the manufacture from New-Zealand-grown wood of sufficient supplies of paper as will demonstrate its high utility value.

A suggestion was advanced in last year's report to improve the dimensional stability and general utility of locally manufactured structural insulating board by incorporation in a composite asbestos-cement layered product. A possibility more recently put forward is that the same objective may be achieved by means of a resin impregnation of the surface of the insulating board, and further investigations are being made along these lines.

91. *Charcoal Production.*—With the general improvement in the war situation throughout the year, no necessity arose for any further charcoal burning. A stock of 30 tons remains, total sales for the year being 32 tons.

CHAPTER XI.—MISCELLANEOUS

92. *Legislation.*—No amendments to the Forests Act, 1921–22, were enacted during the year, and no amendments were made to the regulations under the Act.

93. *Finance.*—Appendix VI of this report summarizes the receipts into and payments out of the State Forests Account during the year ended 31st March, 1945, together with those of the three previous years. The complete accounts are set out in parliamentary paper B.–1 (Pt. IV).

Revenue for the year was £460,800 (£445,303). Revenue from log sales, £54,716 (£73,317), shows a marked reduction as the result both of floods interfering with rimu-logging operations and of much decreased kauri fellings for war purposes, but substantial increases in rimu-log sales are anticipated in the immediate future. Revenue from utilization projects, £207,448 (£171,407), shows, in round figures, an increase of £36,000, against which, however, must be offset an increased expenditure of £21,000.

Expenditure under all headings stands at £748,874 (£557,257). While the additional expenditure is due largely to purchases and replacements of vehicles and heavy equipment and to significant increases in salaries and wages rates, part of it is accounted for by increased land purchases and by preliminary expenses on new areas for development during the post-war rehabilitation period.

The statement in Appendix VI includes payments made in connection with timber-control work, which for 1943–44 amounted to £13,297 and for 1944–45 will be approximately the same. Under the existing arrangements whereby the difference between revenue and expenditure is met out of loan-moneys, the charging of a war expenditure, such as timber-control costs, against the State Forests Account is most undesirable, and action, it is hoped, will be taken to transfer this expenditure to the War Expenses Account.

94. *Subventions to Local Bodies, &c.*—The extent to which subventions of forest revenue to the Consolidated Fund and local bodies have necessitated the raising of additional loan-moneys over the past three years in order to provide the necessary finance for forest activities is shown in the following table :—

Year.	Consolidated Fund (under Section 39 of Forests Act, 1921–22).	Local Authorities (under Section 17 of Finance Act, 1924).	Local Authorities (under Sections 6 and 7 of Forests Amendment Act, 1926–27).	Total.
	£	£	£	£
1942–43	16,721	14,767	7,065	38,553
1943–44	17,455	12,928	7,596	37,979
1944–45	16,196	12,799	6,057	35,052
Totals	50,372	40,494	20,718	111,584
Percentage of indigenous forest receipts	11·79	9·48	4·85	26·12

The relationship which the above subventions of revenue, together with the expenses of timber control bear to the loans raised, is as follows :—

——	1942–43.	1943–44.	1944–45.
	£	£	£
Total loans raised	110,000	110,000	270,000
Timber-control expenses	11,349	13,297	14,000
Subventions of revenue	38,553	37,979	35,052
Total amount	49,902	51,276	49,052
Percentage of total loans	45·34	46·61	18·17

95. *Recreation in State Forests.*—Unfavourable weather conditions during the principal holiday periods and the continuance of restricted road and rail travel resulted in comparatively few visitors to State Forests for general recreation purposes, while reduced activities by camping clubs and kindred societies are inevitable owing to the absence of members on active service.

Piano Flat Camping-ground, Southland, was placed in charge of a caretaker during the Christmas - New Year holidays, when 20 campers occupied the ground, while Hanmer Forest was again an attraction to visitors, and during the year 186 permits to inspect the forest were issued.

Deer-stalkers comprised the greater number of visitors in indigenous State forests, due no doubt to the continued favourable price of deer-skins, and reports indicate that many shooters have been very successful and their visits remunerative. Owing to the extremely dangerous fire hazard, no sporting activities are permitted in exotic State forests.

Some applicants for permits to enter State forests sought permission to carry and use small-bore rifles, but, in accordance with the long-standing policy of protecting bird-life, all applications for the use of rifles with a bore less than ·303 in. were refused.

96. *Forest Privileges :—*

(*a*) *Grazing Privileges :* Licenses and leases number 205 ; 5 were surrendered, 7 granted, and 1 transferred during the year.

(*b*) *Mining Privileges :* During the year 45 applications for mining privileges under the Mining Act, 1926, and 11 applications for coal-mining rights under the Coal-mines Act, 1925—a total of 56 (72)—within State forests were reviewed, and no objections made. In all cases the attention of applicants was drawn to their responsibilities and liabilities in connection with fire prevention and suppression.

97. *Library.*—During the year 372 books and pamphlets were added to the Head Office Library, making the total number of publications 9,051. Quarterly catalogue supplements were circulated both to Head Office and conservancy officers and a copy sent regularly to the Country Library Service for inclusion in the Union Catalogue and periodical and serial holdings to the compiler of the Check List of Serials in New Zealand Libraries.

98. *Rehabilitation.*—An aggregate area of 29,200 acres was acquired for treatment by way of planting open land or of renovating existing indigenous forest. In addition, 26,500 acres had, at 31st March, 1945, received Government approval of purchase, 29,000 acres were under negotiation for purchase, while 126,700 acres had been selected as suitable, with negotiations pending. The gross area acquired during the war period is now 173,400 acres, to which must be added large blocks of planting land aggregating 77,000 acres already proclaimed State forest before the war and not yet planted.

The location of these areas is such that most parts of the Dominion will now have their local timber-producing forests. There are still, however, several virtually timberless districts in which it has not so far been possible to select any suitable afforestation blocks, but search for these is being continued.

A comprehensive five-year plan of forest works for the main rehabilitation period was almost finalized by, and has been completed since, the close of the year. It embraces the forest areas already acquired, and when land for the further contemplated projects has been acquired, these will be incorporated in the general plan. The number of State forests for which planning has been completed is 40, and the works provided for in the plan cover planting, release-cutting, pruning, thinning, felling and extraction of mature timber stands, roading, construction of buildings, and improvements to firebreaks and communications.

Under the plan employment will be found for 2,400 ex-servicemen—all on essential work—and the estimated expenditure amounts to £5,000,000, comprising £3,300,000 for wages and £1,700,000 for equipment, materials, &c. The anticipated immediate revenue is £850,000. For the purpose of supervising the work of the above-mentioned 2,400 ex-servicemen, and of assisting in the control of new forest areas, it will be necessary to increase the permanent and temporary staff by 200, while expansion of felling and extraction operations will require a further 400 men. Including the present departmental salary-and-wages men complement of 1,300 and the current, normal projects on which they are employed, the expanded activities of the Department during the first five post-war years will require 4,300 men and a total expenditure of £11,400,000, the anticipated revenue being £4,400,000.

Reverting to the number of ex-servicemen who can be employed, supplementary projects have been planned to find work, if necessary, for an additional 600 ex-servicemen in the first year, 1,100 in the second and third years, but involving a reduction of 400 men in the fourth and fifth years. These supplementary projects would, it is estimated, cost £600,000, and would yield in immediate revenue £18,000, but most of the work involved is not immediately essential and could be deferred for many years, being organized primarily as an emergency employment measure should no other immediately reproductive work be available in other fields of national effort.

A notable feature of the five-year rehabilitation plan is the provision of comfortable living-quarters for the servicemen to be employed, both married and single. Wherever possible it is proposed to establish community villages well provided with amenities which will render living conditions comfortable and attractive, thus enabling a competent, stable, and well-contented personnel to be built up.

A list of locations in which rehabilitation activities are planned is shown in Appendix X.

99. *Export Butter-box and Cheese-crate Pools.*—The deliveries of timber for butter-box manufacture to North Island boxmakers licensed under the Export Butter-box and Cheese-crate Pool Regulations 1941 amounted to 10,475,000 board feet (15,296,000 board feet). Shipments from the South Island totalled 5,381,000 board feet (10,521,000 board feet), comprising 2,032,000 board feet of white-pine and 3,349,000 board feet of rimu. The balance of timber received, consisting of 4,822,000 board feet of white-pine and 272,000 board feet of rimu, was secured from North Island sawmills. The substantial reduction in receipts recorded was due to shortage of shipping and to the Greymouth bar harbour being unworkable over numerous periods throughout the year.

Due to the decrease in timber deliveries, it was found necessary to secure supplies of other forms of butter-containers. This proved a matter of great difficulty due both to pulp shortages in North America and to shipping, and during the period November to March stocks of boxes held by dairy factories in a few instances fell to a single day's supply. It was found possible to manufacture only 2,607,000 wooden butter-boxes, this figure representing the smallest annual production for many years. The balance of the industry's needs was met by the supply of 500,000 "Saranac" type boxes with fibre-board mats and wooden ends and cleats, and of 970,000 all-fibre carton containers. Of the atter, 450,000 consisted of corrugated kraft fibre-board containers imported from the United States of America, 287,000 of corrugated kraft fibre-board containers fabricated in New Zealand from Canadian kraft liner, and 233,000 solid fibre-board containers manufactured in New Zealand from imported kraft liner and locally made chip board. Whilst reports from Great Britain indicated that the various types of containers used have been reasonably satisfactory as wartime packages, it is nevertheless very clear that improvement in all types so far used will be necessary for post-war trade on a competitive basis. The principal disadvantage common to all forms of fibre-board containers of the dump or carton type has been their inability to retain shape and rigidity, and every opportunity must accordingly be taken to experiment with new types of fibre-board which have been developed in North America to withstand the extremes of handling and moisture imposed by front-line war usage.

At the 31st March, 1945, stocks of boxes held by dairy companies were reduced to the low level of 400,000 (1,457,000). All effort is being concentrated on improving this position for the 1945–46 dairying season, though at the time of writing arrangements which it has been possible to finalize for the supply of Canadian board are insufficient for the industry's needs. However, the Governments

of Great Britain and Canada have been fully acquainted with the Dominion's plight, and it is confidently anticipated that contracts adequate to assure the industry's needs for export butter-boxes will be completed at an early date.

The supply of export cheese-crates to dairy factories totalled 1,229,000 (1,182,000), of which 290,000 crates were made by South Island boxmakers and the balance in the North Island. Licensees in the latter were unable to make all of the crates required by North Island dairy factories, and 82,000 crates made in the South Island were shipped to the North Island. The many handlings which these crates received between inland boxmaker in the South Island and remote dairy factory in the North Island, combined with the inability of boxmakers to secure binding-wire for bundling all battens supplied, resulted in a considerable number of the latter arriving in poor condition. For the 1945-46 season every endeavour will be made to secure North Island cheese-factories' requirements from local boxmakers. Deliveries of timber to North Island cheese-crate manufacturers increased during the year to 12,711,000 board feet (9,203,000 board feet), which will materially assist the policy indicated.

CHAPTER XII.—TIMBER CONTROL

100. *Timber Production Advisory Committee.*—The Timber Production Advisory Committee, which was appointed in November, 1943, by the Minister of Supply and Munitions by notice issued under the Supply and Control Emergency Regulations 1939, continued to function, and held five meetings during the course of the year.

The constitution of the Committee is: Commissioner of State Forests (Chairman), one representative from each of the following: State Forest Service, National Service Department, Ministry of Works, Dominion Federated Sawmillers' Association, New Zealand Timber-merchants' Association, and two representatives from the New Zealand Timber-workers' Union.

The Committee's deliberations centred around ways and means of increasing the production of sawn timber, with much attention given to the man-power requirements of the sawmilling industry and the working of extended hours in bush and mill. Matters dealt with which affected timber production directly or indirectly included the quality of accommodation at bush sawmills, the training of additional bushmen, annual holidays, equipment required by the industry, the release of men from the Armed Forces, and the milling of exotic forests.

101. *Declarations of Timber Industry as Essential.*—Declarations of essentiality affecting the timber industry issued during the year in pursuance of the Industrial Man-power Emergency Regulations 1944 (Serial number 1944/8) are as follows:—

(*a*) Declaration of Essential Undertakings No. 71 (*Gazette*, 1942, page 1394): Applies to certain specified undertakings in respect only of their timber-yards, joinery-factories, and planing-mills. Undertakings added during the year: one declaration, dated 17th August, 1944, and published in *Gazette*, 1944, page 1010; one dated 30th August, 1944, and two dated 6th September, 1944, and published in *Gazette*, 1944, page 1122. In addition, a declaration dated 4th October, 1944, and published in *Gazette*, 1944, page 1245, corrects the name of an undertaking previously declared.

(*b*) Declaration of Essential Undertaking No. 105 (Civilian Services): Undertaking added during the year—maintenance and operation of a railway-line and salvage operations on portion of railway-line being dismantled. Dated 1st November, 1944, and published in *Gazette*, 1944, page 1327.

(*c*) Declaration of Essential Undertaking No. 106 (Civilian Services not specified): Undertakings relating to wood products added during the year—one declaration dated 27th April, 1944, and published in *Gazette*, 1944, page 435; and one dated 25th October, 1944, and published in *Gazette*, 1944, page 1313.

102. *Industrial Man-power.*—Gains in man-power during the year slightly exceeded losses and the accession of an appreciable number of young Grade 1 volunteers from the Pacific theatre of war—even though many were untrained—more than offset the loss of skilled personnel forced to retire through poor health and old age. The shortage of skilled bushmen, however, has become more pronounced than previously, and a large number of mills were unable to get sufficient logs to enable them to work a forty-eight-hour week continuously.

The local Timber Industry Man-power Advisory Committees, under the chairmanship of Regional Timber Controllers, continued to function actively, and the close co-operation thus established between the sawmillers, timber-workers' unions, District Man-power Officers, and the Regional Timber Controllers has been very beneficial in solving problems and securing allocation of man-power to the best advantage.

Notices issued previously to numerous sawmillers and employees to observe a forty-eight-hour week pursuant to the Industrial Man-power Emergency Regulations 1944 continued in force during the year, but during the winter months Regional Timber Controllers found it necessary in some cases to agree to the working of shorter hours, although every effort was made to maintain some extended working-hours in the bush in order that mills could be operated at least forty hours each week.

The following notices suspended the operation of the forty-eight-hour week requirement during holidays and permitted workers to take such holidays as they were entitled to under the Annual Holidays Act, 1944:—

(*a*) The Sawmilling Industry (Easter Holidays) Notice 1944 (*Gazette*, 1944, page 288): This notice required every sawmilling undertaking and every employee to continue working until the usual closing-time on Wednesday, the 5th April, 1944, and to resume not later than the usual commencing time on Wednesday, the 12th April, 1944.

(*b*) Labour Day, Monday, 23rd October, 1944, was observed by the sawmilling industry as a statutory holiday, and the forty-eight-hour week requirement relaxed by individual notices issued through Regional Timber Controllers. A public notice was not issued.

(*c*) The Sawmilling Industry (Christmas Holidays) Notice 1944 (*Gazette*, 1944, page 1467): This notice required every sawmilling undertaking and every employee to continue working until the usual closing-time on Thursday, 21st December, 1944, and to resume not later than the usual commencing time on Wednesday, 10th January, 1945.

Provision was made in these notices for relaxation or variation to meet individual requirements by consent of the Timber Controller.

The Timber Industry Labour Legislation Modification Order 1941 (*Gazette*, 1941, page 3959), issued by the Minister of Labour under the Labour Legislation Emergency Regulations 1940 (1940/123), was revoked by notice published in *Gazette*, 1945, page 158, effective from 7th February, 1945. This Order modified Timber Workers' awards throughout the Dominion by providing—

(*a*) For the making up on a Saturday of time lost during the preceding three weeks in lieu of the preceding five days as provided by the awards; and

(*b*) For payment of overtime worked on Saturday at the rate of time and a half for the first eight hours instead of at the rate of time and a half for the first four hours and double time thereafter as provided by the awards.

The voluntary surrender by the union of these award rights which only now have been restored after almost three years' suspension constitutes a real contribution to the country's war effort which is not surpassed by that of any other industry. Following the restoration of award conditions, some mills, by arrangement between all concerned, are working alternate weeks of five and six days of eight hours each, except that longer hours are worked in logging operations where necessary to maintain mills in logs for an average working-week of forty-four hours.

The working of extended hours by sawmills directed under Regulation 20 of the Industrial Manpower Emergency Regulations has been subsidized from the War Expenses Account since the coming into force of the Timber Industry Labour Legislation Modification Order 1941, mentioned above, to the extent of 80 per cent. of the extra wages cost over and above ordinary rates—*i.e.*, 80 per cent. of half-time. Since 7th February, 1945, when the revocation of the Order became effective, the subsidy has been increased to cover 80 per cent. of the extra cost for overtime at time and a half rates worked during the week and on Saturday mornings, and 100 per cent. of the extra cost of overtime at double rates worked on Saturday afternoons. The Forest Service checks all claims from the industry for the subsidy, and during the year has passed for payment amounts totalling £76,024 (£69,515). The extra production resulting from the operation of the subsidy is calculated at approximately 27,000,000 board feet (25,000,000).

103. *Petrol and Tire Conservation and Vehicle and Tractor Supplies.*—The Forest Service has continued to act in an advisory and law enforcement capacity to the Commissioner of Transport and Oil Fuel Controller in respect to the use of petrol and tires by the various sections of the industry. As the distribution of virtually all timber-supplies throughout the country is under the joint or separate control of Zonal End-Use Committees, various sawmillers' organizations and the Office of the Timber Controller, all applications for petrol and tires in order to allow either individual merchants or users to canvass the various mills for supplies have been declined. Much assistance was rendered the industry by way of arranging for the supply of parts and new plant, and for the hiring of tractors and other essential equipment. The close co-operation of the Public Works Department and the Transport Department in the supply of equipment has enabled all essential work to be continued, and is acknowledged with appreciation.

104. *Essential Supplies.*—Due to a general easing of the supply position, items which were held as national reserve stocks have now been absorbed into bulk supplies and the control authority's approval of releases is no longer necessary for the procurement of saws, wire ropes, corrugated fasteners, hoop steel, and steel rails.

105. *Timber Purchases for Defence Works.*—Purchases of timber for defence purposes amounted to only £80,380 (£800,860), of which £61,487 was in part payment of a shipbuilding order placed in the preceding period and the balance for timber supplied during that period. As stated in last year's report, the Forest Service ceased the purchase of timber for defence purposes towards the end of 1943, but has continued to function as a clearing-house for defence and emergency requirements by placing orders on behalf of purchasing authorities in some instances and by advising others of the most suitable sources of supply.

106. *Timber Control Notices.*—The following Timber Control notices were issued pursuant to the Supply Control Emergency Regulations 1939 and Timber Emergency Regulations 1939:—

(*a*) Timber Control Notice No. 56, dated 17th May, 1944, and published in *Gazette*, 1944, page 622, requires that no sawmiller or timber-merchant or other person who in the course of his business sells building timber shall sell, offer for sale, or otherwise dispose of rimu, miro, matai, or totara building timber unless it is classified and graded, and such classification and grading complies with the provisions of New Zealand Standard Specification for Classification and Grading of New Zealand Building Timber (National Grading Rules) numbered N.Z.S.S. 169. The National Grading Rules set out clearly a convenient method of classifying and grading timber, and their adoption throughout the Dominion will protect purchasers against delivery of grades lower than those specified.

(*b*) The Railway Sleepers Production Notice 1945, No. 1, dated 23rd February, 1945, was issued to certain specified North Island sawmillers requiring them during March to saw at least 20 per cent. of their totara production into railway-track sleepers and consign them as required to the Railway Department.

This action was necessary owing to the impossibility of importing a sufficient quantity of hardwood sleepers from Australia. The requirements of this notice were renewed for the month of April by Notice No. 2 dated 26th March, 1945.

(*c*) Timber Control Notice No. 51 (*Gazette*, 1942, page 2825) requires that insignis-pine (*Pinus radiata*) timber shall not be cut, sold, or used except for the manufacture of wooden containers without the precedent consent of the Timber Controller. The provisions of this notice were relaxed during the latter half of 1944 when demand for insignis-pine timber for essential foodstuff containers eased, but early this year the Dominion was called upon to execute new and heavy contracts for export foodstuffs which required the bulk of the insignis pine produced to be used for the necessary containers. Consequently a letter dated 29th March, 1945, was sent to all insignis-pine sawmillers advising that the provisions of the notice were reimposed and that permits for the use of this timber for other than the manufacture of wooden containers would be granted only in exceptional cases.

(*d*) Delegation of Powers of Timber Controller: By notice dated 28th August, 1944, issued pursuant to Regulation 4 of the Supply Control Emergency Regulations 1939, the Timber Controller delegated to Bertrand Walsh, of Hamilton, secretary of the North Island Sawmillers' Distribution Association, powers to act for the Timber Controller as directed in the regulation and control of the sale, supply, distribution, and disposal of sawn timber within specified counties in the central North Island and Bay of Plenty districts.

(*e*) Supplies of Seasoned Timber: During the emergency period when a heavy demand existed for timber for defence units it was found necessary to direct timber-supplies to approved dry kilns throughout the Dominion. This policy made available a maximum quantity of seasoned timber, and undoubtedly avoided serious dislocations in the wood-using industries. In continuation of the policy of removing control as soon as circumstances warrant, sawmillers during the year were relieved of directions to supply timber to kilns in Hamilton and Napier. It is hoped that during the current year it will be possible to uplift similar directions regarding the supply of timber to other centres.

107. *Removal and Erection of Sawmills Notice 1941 (Serial Number 1941/236).*—A total of thirty-five consents to the removal and erection of sawmills was given under the provisions of the Notice, fifteen being for the erection of new mills and twenty for the removal of existing sawmills to new sites. In view of the continued man-power shortage in established sawmilling units throughout the Dominion, all applicants for consent under the notice were required to give assurance that they could secure the necessary operating staff without having to engage workers already employed in the sawmilling industry.

Two consents were issued for the erection of sawmills for the cutting of insignis pine to be secured from forests owned by afforestation companies. In view of the fact that the forests are comparatively young immature stands, the consents were conditional upon the installation of sawmills containing reasonably suitable equipment—under present conditions—for the economical conversion of the small timber involved. So far as equipment can be secured, it is required that such mills shall include Pacific breakdown bench, breast bench, and deal frame, the use of which should reduce waste to a reasonable figure. In view of the extremely high fire risk in exotic forests, millers are also required to take appropriate precautions against fire and to provide adequate fire-fighting equipment.

108. *Sale and Purchase of Forests.*—In terms of Regulation 3 of the Timber Emergency Regulations 1939 (1939/148), 520 (357) applications for consent to the sale and purchase of forests were dealt with during the year, and consents issued. The transactions involved fall into three groups:—

(*a*) *Privately-owned Forests.*—The continued urgent demand for timber-supplies for the manufacture of munitions and foodstuff containers was again reflected in the numerous applications for sale and purchase of privately-owned insignis-pine trees, chiefly from small farm lots and shelter-belts.

As reasonable supplies of logs have been made available by agreement between owners and sawmillers, it was again unnecessary to use the compulsory powers of the Timber Emergency Regulation 1939 whereby the Timber Controller may by notice require an owner to dispose of his trees to such sawmiller as the Controller may nominate. In some cases, farmers would have preferred to retain trees on sentimental grounds, but, recognizing the necessity for maintaining maximum production, trees were duly made available, and the co-operation of the farming community is acknowledged and appreciated.

In order to avoid an important sawmill closing down owing to an occupier refusing to renew an easement over his property it was necessary to use the compulsory powers of the Timber Emergency Regulations 1939 as amended, 1943/106, and to authorize the sawmiller to continue the use of his access.

(*b*) *Maori-owned Forests.*—Four cases affecting Maori-owned forests in Rotorua, Wellington, and Southland Conservancies were brought under action during the year. Urgent supplies of logs were required in all cases to keep sawmills in continuous production, and as there was insufficient time for negotiations in the ordinary way arrangements were actioned by the issue of notices under the Timber Emergency Regulations 1939 requiring the Maori owners to sell their interest in the forests affected to the proprietors nominated by the Timber Controller. Upon the expiration of the period of twenty-one days for the receipt of objections provided by the regulations no well-grounded objection was received, and the transactions are therefore being completed. The sawmillers concerned have been authorized to commence cutting.

It is emphasized that in all such cases the interests of the owners are protected by suitable terms of payment and conditions of operation. The value of the timber in the forest is fixed after appraisal by the Forest Service in accordance with established procedure in respect of all Maori-owned forests, and the instruments of sale are subject to confirmation by the Native Land Courts.

Following direction notices issued during the preceding year, three licenses for the sale of forest and one for a road easement giving access to one of the forests sold in the Wellington Conservancy were issued and subsequently confirmed by the Native Land Court.

(*c*) *Exotic Forests (Commercial).*—Four consents to the sale and purchase of exotic forests established for commercial timber production and owned by afforestation companies were granted subject to conditions requiring each vendor company to submit for approval a working plan prepared by a qualified forester setting out proposals for the silvicultural management of the forest and re-establishment of the area which will be cut over annually, together with details of fire-prevention and control measures to be undertaken. Three working plans were received; one was approved with amendments, and two are under consideration.

These sales of exotic forest are an indication of the tendency towards the greater utilization of insignis-pine timbers, and naturally afforestation companies are desirous of benefiting by the continued buoyant market for this timber and are tempted to realize on their forest assets which are still rather immature, none of them having been established for more than twenty years. Consequently, the steps taken to require re-establishment and protection from fire are considered necessary both in the public interest and in that of shareholders in order to ensure so far as practicable that the productivity of these forests is maintained.

109. *The Timber Position.*—Demand for timber for large-scale defence works, hospitals, &c., decreased considerably during the year, and the building industry reverted largely to house building. Due, however, to the combined effects of various factors, including depleted timber stocks, road and rail transport difficulties, high consumption capacity of building labour, &c., it became very evident that the building and other wood-consuming industries would face chaos if both distribution and use of timber did not remain under some form of control. In the North Island, which had felt the impact of the war demand more seriously than the South Island, it soon became clear that a more intensive control was necessary than had existed even during the defence-construction-programme period, when, to some extent, the problem of timber use had been simplified by a virtual prohibition on the issue of building permits for work unconnected with defence plans. Representatives of the Building and Timber Controllers conferred accordingly with all parties concerned in the production, distribution, and use of timber in the North Island, and, as foreshadowed in last year's report, detailed control of each phase was delegated to the appropriate sections of the various industries involved, leaving only general policy control to be exercised by the officers of the Timber Controller.

For the purpose of ensuring an equitable distribution of all timber other than that for the box and crate industry, which is dealt with separately, the North Island was divided into seventeen consuming zones, to each of which was allocated a quota of the timber available on the basis of its estimated relative needs. The majority of the sawmillers in the principal timber-producing districts formed themselves into an organization called the North Island Sawmillers' Distributing Association, and undertook to ensure that production was distributed in accordance with the quotas agreed to jointly by the Building and Timber Controllers. End-Use Committees, including representatives of timber-merchants, wood-users, and workers' organizations, and partly financed by the Government, were established in each zone and charged with the responsibility of ensuring that such timber as was made available was distributed equitably and in the public interest. All organizations concerned have worked with enthusiasm, and the results have been sufficiently promising to encourage the belief that by a continuation of their activities it will be possible to avoid the introduction of priority cutting and permit control of distribution, as has been found necessary in many other countries. The fact that both the distributing association and the End-Use Committees have been informally organized without compulsory participation and that there have been few non-co-operative elements is a high tribute to both the co-operative spirit and forbearance exercised by the great majority of individuals in the various industries concerned.

From October, 1944, onwards timber distribution was seriously upset in the North Island due to an ever-increasing shortage of railway-trucks, and Auckland and other consuming districts which relied mainly on this form of transport suffered considerable hardship. By February the position had deteriorated so badly that, in order to avoid grave dislocations in the building and allied industries, the Government approved of road transport of timber to supplement rail deliveries. Road trucks were used for approximately two months, during which period they carried 3,500,000 board feet of timber for distances up to 160 miles, though most of the timber was carried over very much shorter distances, leaving what few rail trucks were available for operating over the longer distances. Had no road transport been available not only would the building and furniture trades have been without timber, but some sawmills would have been forced to cease production owing to their inability to stack substantial quantities of timber at their plants. Owing to an acute shortage of truck-tires, transport by road was discontinued in April. The extra cost incurred through this form of transport is being met from the War Expenses Account by means of a subsidy, claims for which are checked by the Forest Service, and, although payments are as yet incomplete, it is expected that the total sum involved will be approximately £5,000. Although some improvement in rail transport has been secured it has not been sufficient to shift current production, and stocks are steadily accumulating at bush sawmills, where they are virtually immobilized. Due to shipping being unable to use the Little Wanganui Harbour, it has been found necessary since October, 1944, to transport timber by road from Karamea to Westport. Here again the extra cost has been borne by the War Expenses Account, the Forest Service having passed for payment claims amounting to £686 in respect of 275,000 board feet so carried. It is a most unfortunate anomaly during a period of acute demand that timber actually produced cannot be made available to consumers due to transport shortages.

As in previous war years, the timber position has been less acute in the South Island, and its building trade and allied wood using industries have been able to operate at higher levels relative to their pre-war activities than those in the North Island. Nevertheless, more frequent and widespread representations from local interests extending from Blenheim to Dunedin, and including Christchurch, with a wartime supply exceeding its pre-war figures indicate that the position may soon deteriorate to a point where

it will be necessary to determine consuming zones and quotas and organize End-Use Committees as in the North Island. It is still hoped that this may be avoided, but the frequency of representations by sectional and local interests for increased supplies indicates otherwise.

110. *Timber-prices.*—No significant developments have occurred in the price field, and, despite a number of rumours of black marketing and excessive prices, all of which were investigated, no serious case of overcharging was discovered during the year by officers either of the Timber Controller or of the Price Investigation Tribunal.

The Office of the Timber Controller, however, has been forced to the reluctant conclusion that the cumulative effect of long-continued price-control dating back to 1936 has attained such proportions as to threaten enterprise and stifle progress in the industry. While the industry has never seriously challenged the dictum laid down in 1936 that price increases would be permitted only to an extent sufficient to cover proven increases in cost resulting either from higher wages or more costly supplies and equipment, it does feel that the time-lag involved in securing approval to some of these costs has, over the years, imposed such a burden on most operators that the reduced profit margin is not commensurate with the risks involved.

Concurrently with the economic study of the industry now being made by the Forest Service (see para. 64), the national sawmillers organization is making an operating and financial survey which should throw much light on its earning-capacity, but there is little doubt that unless the downward trend in unit profit margin is reversed either by reduced costs or by increased prices specifically approved for this purpose, then the industry must languish under an ever-increasing feeling of defeatism engendered by nine years of price-control—a period, incidentally, three years longer than that under which any other industry has operated.

111. *Timber-production.*—The year was characterized by an ever-widening appreciation throughout many sections of the community of the high production record of the timber industry. With over 10 per cent. less employees and highly diluted in respect to skilled personnel, the industry, by working extended hours, not only maintained, but actually increased production by almost 10 per cent.—a record unsurpassed by any other industry in this country. What has assisted to throw this achievement into bold relief has been serious recessions in the production of cement and bricks at the very time that these materials might have relieved the demand for timber for hospitals, secondary schools, and other buildings for which they are more suitable. Similarly, in the field of housing, critical shortages in linings, bath-tubs, ranges, &c., have become increasingly significant, and the service rendered by the timber industry better appreciated.

Collaterally, man-power deficiency in the industry has become widely if not universally recognized during the year as the keynote to increased timber production, and co-operation by the industry in shaping policy accordingly has been most appreciated and helpful. Even so the enormous extent to which a truly skilled and balanced personnel in bush and milling operations could increase production, even in currently working units, is seldom appreciated. Provided all other deficiencies, such as tractors and other critical items of equipment, &c., were remedied, established operations could produce with such a personnel even on a forty-hour-week basis as much as 450,000,000 board feet annually—as compared with the current production of 350,000,000 board feet—so long as their bush resources lasted. Unfortunately, mills are cutting out of immediately convenient resources month by month, and it is for this reason that so much current emphasis, as evidenced by numerous references in this report, is being placed on the expansion of timber-cruising staff for the reconnaissance of new areas and the relocation of old and the establishment of new mills.

With the accession of man-power in the post-war period it is confidently anticipated that no trouble will be experienced in rapidly attaining a production level adequate to the needs of the country's national economy.

APPENDIX I

AREAS OF STATE FOREST AS AT 31ST MARCH, 1945

Conservancy.	Permanent State Forest.		Provisional State Forest.		Totals.	Percentage of Land Area under State Forest Reservation.
	Ordinary.	National Endowment.	Ordinary.	National Endowment.		
	Acres.	Acres.	Acres.	Acres.	Acres.	
Auckland ..	412,128	89,789	135,031	14,006	650,954	7·57
Rotorua ..	694,701	286,760	143,435	63,108	1,188,004	15·04
Wellington ..	1,001,885	41,135	33,068	3,808	1,079,896	8·92
Nelson ..	1,061,392	216,076	785,643	526,001	2,589,112	36·94
Westland ..	916,904	354,030	362,615	227,326	1,860,875	48·17
Canterbury ..	486,560	3,647	..	..	490,207	4·92
Southland ..	536,462	56,234	633,679	13,740	1,240,115	7·3
Totals as at 31st March, 1945	5,110,032	1,047,671	2,093,471	847,989	9,099,163	13·7
	6,157,703		2,941,460			

APPENDIX II

SUMMARY OF PLANTING AND SILVICULTURAL OPERATIONS IN STATE FORESTS AS AT 31ST MARCH, 1945

Project.	Year of Commencement.	Gross Area of Forest.	Total Net Area planted.	New Area planted, 1944.	Area treated, 1944–45.			
					Low-pruned.	High-pruned.	Thinned.	Clear-felled.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Mangonui	1944	8,927	3	3	..	..	..	..
Waipoua	1925	12,600	3,904	73	539	17	..	..
Puhipuhi	1904	1,565	1,209	..	20	28	..	..
Whangarei	*	4,930	..	..	..	..	..	..
Riverhead	1926	11,965	10,593	..	155	..	..	..
Tairua	1930	48,510	13,442	45	28	38	..	..
Kauaeranga	1940	4,000	548	44	50	..	..	..
Maramarua	1928	14,087	12,311	..	416	..	..	..
Rotoehu	1937	35,063	5,122	426	228	..	..	..
Whakarewarewa	1898	10,065	7,539	57	9	..	190	180
Waiotapu	1901	7,974	6,903	..	..	15	96	16
Kaingaroa	1913	344,397	259,431	425	1,767	1	1	7
Tongariro	1937	4,500	2,300	..	..	..	..	..
Erua	1930	6,648	4,390	40	28	..	..	..
Karioi	1927	25,869	17,195	..	419	12	4	..
Gwavas	1944	8,645	7	7	..	..	..	..
Masterton	1942	5,243	13	9	..	..	..	..
Golden Downs	1927	41,939	22,906	229	8	..	1	..
Westland	1922	5,839	3,090	..	9	..	..	..
Hanmer	1901	10,571	7,684	..	179	..	14	..
Balmoral	1916	24,141	21,268	..	194	..	303	..
Eyrewell	1928	19,266	17,383	..	202	20	34	48
Ashley	1939	5,099	1,722	228	..	..	..	..
Naseby	1900	4,032	3,095	..	10	5	..	3
Herbert	*	3,197	..	..	..	..	..	..
Berwick	*	5,165	..	..	..	..	..	..
Allanton	*	1,676	..	..	..	..	..	..
Dusky	1898	6,866	4,430	..	138	38	203	22
Conical Hill	1903	4,534	4,164	..	19	33	90	..
Blue Mountains	1925	10,058	8,889	17	76	149	16	..
Pebbly Hills	1930	5,330	4,349	7	108	33	..	..
Minor areas	1875–1939	12,408	3,273	138	71	2	..	..
Totals	..	715,109	447,163	1,748†	4,673	391	952	276

* New projects. † Includes 128 acres interplanted in indigenous forest.

APPENDIX III

Creosoted Forest Produce

—	Year ended 31st March, 1944.				Year ended 31st March, 1945.			
	Posts and Strainers.	Poles.	Other Creosoted Produce.	Total Quantity of Creosoted Produce.	Posts and Strainers.	Poles.	Other Creosoted Produce.	Total Quantity of Creosoted Produce.
	Number.	Number.	Cu. ft.	Cu. ft.	Number.	Number.	Cu. ft.	Cu. ft.
Produce creosoted ..	72,688	4,322	2,006	102,938	103,371	5,602	4,556	124,697
Sales	57,833	2,177	338	70,256	100,227	4,986	724	126,886
Creosoted produce used by State Forest Service	1,668	298	1,714	4,504	7,114	2,168	2,138	18,299
Creosoted stocks at end of year	39,844	5,034	561	80,299	36,269	3,860	3,090	65,773
Untreated stocks at end of year	126,227	16,246	8,771	217,147	82,001	13,129	46	162,720
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.
Creosote used	56,078	24,603	2,025	82,706	90,080	30,023	5,755	125,858

APPENDIX IV

Imports of Sawn Timber and other Forest Produce

(From information supplied by the Comptroller of Customs. All figures refer to the years ended 31st December, 1942–44. Value represents value in country of export, plus 10 per cent. expressed in terms of New Zealand currency. The figures for 1943 and 1944 are tentative.)

Item.	1942.		1943.		1944.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Hardwoods—	Bd. ft.	£	Bd. ft.	£	Bd. ft.	£
Sleepers	5,923,000	107,000	3,470,000	58,000	3,781,000	63,100
Australian hardwoods ..	6,672,000	136,600	6,304,000	150,000	6,368,000	151,200
Total	12,595,000	243,600	9,774,000	208,000	10,149,000	214,300
Softwoods—						
Douglas fir	1,151,000	18,700	3,539,000	52,200	3,784,000	59,700
Redwood	..	..	1,364,000	41,300	1,205,000	35,200
Total	1,151,000	18,700	4,903,000	93,500	4,989,000	94,900
Other	659,000	43,700	37,000	2,700	40,000	3,000
Grand total ..	14,405,000	306,000	14,714,000	304,200	15,178,000	312,200
Shingles	..	..	..	20	..	59
	Tons.		Tons.		Tons.	
Tanning-bark	229	4,339	224	1,952	56	768
Wood-pulp	2,040	48,072	2,707	61,281	11,439	246,672

APPENDIX V

EXPORTS OF SAWN TIMBER AND OTHER FOREST PRODUCE

(From information supplied by the Comptroller of Customs. All figures refer to the years ended 31st December, 1942–44. Figures for 1943 and 1944 are tentative.)

Item.	1942.		1943.		1944.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Bd. ft.	£	Bd. ft.	£	Bd. ft.	£
White-pine	334,000	3,740	137,000	1,670	206,000	2,420
Rimu	5,412,000	61,230	2,261,000	25,500	2,416,000	28,290
Beech	142,000	2,340	719,000	11,650	988,000	15,340
Matai	31,000	370	78,000	940	28,000	570
Kauri	50,000	2,300	18,000	820	9,000	420
Insignis pine	1,469,000	24,330	1,159,000	19,680	544,000	11,410
Other New Zealand ..	2,000	130	20,000	680	52,000	1,070
Foreign	35,000	1,220	148,000	11,670		
Total	7,475,000	95,660	4,540,000	72,610	4,243,000	59,520
	Tons.		Tons.		Tons.	
Kauri-gum	1,061	74,737	590	44,528	1,132	74,426

APPENDIX VI

PAYMENTS AND RECEIPTS FOR THE YEAR ENDED 31ST MARCH, 1945

Item.	1944–45.	1943–44.	1942–43.	1941–42.
Payments				
Allocation of revenue—	£	£	£	£
Consolidated Fund (portion of revenue from national-endowment forests)	16,196	17,455	16,721	20,442
Working Railways Account (section 24 (1), Finance Act, 1936)	..	549	898	1,151
Local bodies	12,799	12,928	14,767	17,080
General management charges—				
Salaries	110,317	89,332	79,793	81,667
General expenses	56,019	41,254	34,370	28,458
Land purchase	38,957	11,687	25,307	1,996
Forestry projects under direct management—				
Exotic	346,743	248,705	220,598	183,561
Indigenous	41,912	30,521	22,945	35,376
Utilization: Sawmill, creosote plant, &c. ..	125,931	104,826	100,720	136,090
Miscellaneous: Expenses of raising loans and interest on temporary advances	..	..	..	978
Totals	748,874	557,257	516,119	506,799
Receipts				
Indigenous forest receipts—				
Timber sales	121,603	114,553	134,396	127,926
Timber royalties and trespass	9,250	8,588	9,467	9,532
Leases, grazing	1,611	1,402	1,492	1,523
Sawmill sites, industrial, &c.	308	247	239	329
Miscellaneous	9,124	6,895	8,017	8,274
Log sales from managed forests	54,716	73,317	30,596	31,296
Exotic forests: Poles, posts, firewood, &c. ..	45,938	51,952	54,234	15,341
Utilization projects—				
Sawn timber	22,529	16,180	40,607	45,815
Creosoted products	45,918	15,964	23,637	19,262
Box shooks	129,126	136,600	79,109	32,883
Miscellaneous	9,875	2,663	4,767	3,642
Miscellaneous credits	10,802	16,942	13,371	9,800
Totals	460,800	445,303	399,932	305,623
Receipts from national-endowment indigenous forests (included in above)	47,526	46,654	48,289	45,374

APPENDIX VII

Sawmilling and Sash and Door Manufacturing, 1943–44

Provincial District.	Number of Mills or Establishments.	Character of Organization.						Persons engaged in connection with Felling, Hauling, &c.						Persons engaged in connection with Production of Sawn Timber from Logs.							
		Individual.	Partnership.	Registered Company.		Co-operative and Miscellaneous.	Government.	Proprietors actively engaged.	Managers, Overseers, &c.	Accountants, Clerks, &c.	Wage-earners.	Contract.	Total.	Proprietors actively engaged.	Managers, Overseers, &c.	Accountants, Clerks, &c.	Wage-earners.		Contract.	Total.	
				Public.	Private.			M.	M.	M.	M.	M.	M.	M.	M.	M.	F.	M.	M.	M.	F.
Auckland ..	146	26	32	25	60	1	2	19	36	2	539	83	679	39	92	55	33	1,278	48	1,512	33
Hawke's Bay ..	22	4	2	4	12	..	..	1	4	..	61	12	78	2	9	6	1	108	..	125	1
Taranaki ..	25	5	..	6	13	1	..	1	1	..	192	39	233	1	14	11	6	215	..	241	6
Wellington ..	64	10	4	6	44	..	..	6	19	..	294	4	323	9	36	16	7	382	1	444	7
Marlborough ..	8	4	1	..	3	..	..	2	..	..	11	..	13	3	1	..	..	15	..	19	..
Nelson	58	12	15	3	28	..	..	17	10	1	253	5	286	17	23	3	1	238	1	282	1
Westland ..	33	1	3	1	28	..	..	2	15	3	323	25	368	1	26	14	4	316	43	400	4
Canterbury ..	38	9	9	2	18	..	..	7	1	..	39	5	52	15	8	2	2	138	..	163	2
Otago—																					
Otago portion ..	24	4	3	4	12	1	..	4	6	1	58	..	69	5	7	1	3	80	..	93	3
Southland portion	35	6	3	..	26	..	..	7	11	2	177	1	198	5	19	11	3	229	..	264	3
Totals, 1943–44	453	81	72	51	244	3	2	66	103	9	1,947	174	2,299	97	235	119	60	2,999	93	3,543	60
,, 1942–43	422	70	61	52	234	3	2	39	92	12	1,889	181	2,213	73	215	111	47	2,936	97	3,432	47
,, 1941–42	458	87	74	51	242	4	..	54	91	6	1,966	297	2,414	92	223	128	40	3,028	64	3,535	40

Provincial District.	Persons engaged in connection with Resawing, Dressing, &c.									Persons engaged in connection with Total.									Salaries and Wages paid to Persons engaged in connection with Felling, Hauling, &c.	Production of Sawn Timber from Logs.		Resawing, Dressing, &c.		Total.	
	Proprietors actively engaged.	Managers, Overseers, &c.	Accountants, Clerks, &c.	Wage-earners.		Contract.	Total.			Proprietors actively engaged.	Managers, Overseers, &c.	Accountants, Clerks, &c.	Wage-earners.		Contract.	Total.									
	M.	M.	M.	F.	M.	F.	M.	M.	F.	M.	M.	M.	F.	M.	F.	M.	M.	F.	£	£	£	£	£	£	£
Auckland ..	3	52	40	35	697	20	4	796	55	61	180	97	68	2,514	20	135	2,987	88	244,129	484,148	4,515	270,673	9,664	998,950	14,179
Hawke's Bay ..	1	4	3	2	57	..	..	65	2	4	17	9	3	226	..	12	268	3	29,284	47,469	340	20,681	219	97,434	559
Taranaki ..	1	7	3	5	89	..	..	100	5	3	22	14	11	496	..	39	574	11	86,826	85,064	787	34,227	753	206,117	1,540
Wellington ..	2	25	15	14	260	..	..	302	14	17	80	31	21	936	..	5	1,069	21	117,302	146,779	1,096	85,023	2,397	349,104	3,493
Marlborough ..	..	..	..	..	..	..	..	..	..	5	1	..	..	26	..	..	32	..	3,541	5,824	..	..	..	9,365	..
Nelson	3	7	3	3	83	3	1	97	6	37	40	7	4	574	3	7	665	7	96,843	92,758	216	29,970	763	219,571	979
Westland ..	..	1	..	1	11	..	..	12	1	3	42	17	5	650	..	68	780	5	137,642	141,865	590	3,842	157	283,349	747
Canterbury ..	4	14	13	12	180	..	..	211	12	26	23	15	14	357	..	5	426	14	17,116	51,435	196	65,222	1,696	133,773	1,892
Otago—																									
Otago portion ..	..	10	10	6	123	1	..	143	7	9	23	12	9	261	1	..	305	10	24,589	32,560	290	45,842	1,104	102,991	1,394
Southland portion	1	3	2	3	66	1	..	72	4	13	33	15	6	472	1	1	534	7	68,996	89,795	372	20,508	432	179,299	804
Totals, 1943–44	15	123	89	81	1,566	25	5	1,798	106	178	461	217	141	6,512	25	272	7,640	166	826,268	1,177,697	8,402	575,988	17,185	2,579,953	25,587
,, 1942–43	14	120	93	72	1,556	27	..	1,783	99	126	427	216	119	6,381	27	278	7,428	146	755,320	1,127,150	7,905	543,667	14,300	2,426,137	22,205
,, 1941–42	20	123	103	56	1,762	5	3	2,011	61	166	437	237	96	6,756	5	364	7,960	101	703,235	1,023,388	5,752	543,706	9,333	2,270,329	15,085

APPENDIX VII—*continued*

SAWMILLING AND SASH AND DOOR MANUFACTURING, 1943–44—*continued*

Expenses of Operation, other than Salaries and Wages and Cost of Materials.

Provincial District.	Production of Logs at Mill.							Production of Sawn Timber from Logs.							Resawing, Dressing, and Manufacturing from Sawn Timber.							Cost of Materials used or operated upon.			
	Rent.	Cost of Power.	Fire and Accident Insurance (Premiums).	Depreciation.	Repairs.	Other Expenses.	Total	Rent.	Cost of Power.	Fire and Accident Insurance (Premiums).	Depreciation.	Repairs.	Other Expenses.	Total.	Rent.	Cost of Power.	Fire and Accident Insurance (Premiums).	Depreciation.	Repairs.	Other Expenses.	Total.	Stumpage.	Logs purchased.	Rough-sawn Timber purchased and other Materials.	Total.
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Auckland ..	874	28,884	12,163	32,094	82,678	62,626	220,319	3,861	14,791	23,714	29,786	62,218	62,782	197,152	5,603	11,707	15,316	17,171	29,356	30,987	110,140	139,897	282,441	1,019,017	1,441,355
Hawke's Bay ..	5	2,431	1,097	1,340	3,418	1,106	9,397	66	908	2,919	2,097	4,114	2,315	12,419	168	770	987	927	1,221	2,591	6,664	15,945	6,957	72,053	94,955
Taranaki ..	46	5,232	4,559	16,228	15,936	1,636	43,637	1,151	2,115	4,210	4,344	17,236	4,017	33,073	349	1,166	1,770	1,480	4,781	1,868	11,414	28,412	24,086	70,763	123,261
Wellington ..	158	8,160	4,563	8,894	26,089	4,257	52,121	1,023	4,384	7,698	8,102	21,655	12,402	55,264	1,731	3,583	5,023	5,191	6,220	7,757	29,505	68,658	23,628	311,069	403,355
Marlborough ..	26	1,422	185	476	549	59	2,717	75	725	287	587	868	395	2,937	..	..	..	..	..	..	..	1,386	2,364	..	3,750
Nelson	520	6,843	4,121	8,678	16,782	6,384	43,328	960	3,819	5,110	6,785	11,212	7,025	34,911	692	1,646	741	1,266	1,479	913	6,737	30,165	2,459	87,417	120,041
Westland ..	1,061	8,589	7,097	9,107	19,151	8,701	53,706	1,453	5,402	8,218	6,413	14,792	8,236	44,514	116	134	205	84	643	110	1,292	43,311	2,562	16,869	62,742
Canterbury ..	59	4,395	832	608	1,841	1,336	9,071	602	4,627	2,875	1,990	5,843	3,850	19,787	1,183	3,369	4,779	3,773	7,203	4,036	24,343	13,458	48,557	215,523	277,538
Otago—																									
Otago portion ..	51	1,777	1,320	1,073	4,413	1,875	10,509	297	443	2,135	1,832	4,845	2,947	12,499	1,782	2,187	2,705	2,421	5,206	4,981	19,282	6,082	7,828	136,918	150,828
Southland portion	146	4,833	3,921	3,205	11,726	3,906	27,737	420	1,973	4,278	3,708	10,802	5,723	26,904	430	1,732	1,468	1,551	2,502	2,313	9,996	20,692	3,082	80,999	104,773
Totals, 1943–44	2,946	72,566	39,858	81,703	183,583	91,886	472,542	9,908	39,187	61,444	65,644	153,585	109,692	439,460	12,054	26,294	32,994	33,864	58,611	55,556	219,373	368,006	403,964	2,010,628	2,782,598
,, 1942–43	3,208	48,500	36,409	75,717	158,739	84,704	407,277	9,215	36,372	57,211	61,447	136,129	121,252	421,626	11,082	23,157	30,151	28,616	48,735	58,529	200,270	346,334	347,885	1,952,407	2,646,626
,, 1941–42	2,571	43,871	33,023	85,746	128,604	76,424	370,239	10,451	30,340	49,186	53,523	112,012	118,042	373,564	16,133	21,447	29,770	26,818	39,851	64,088	198,107	350,689	180,378	1,976,746	2,507,813

Products.

Provincial District.	Total Costs of Operation (including Salaries and Wages).				Log Sawmill Products.				Resawing and Planing-mill Products.										Total Value of all Products.
	Felling, Hauling, and Delivering Logs at Mill.	Production of Sawn Timber from Logs.	Resawing, Dressing, and Manufacturing from Sawn Timber.	Total.	Rough-sawn Timber.		Laths, Posts, Waste Products, &c.	Total.	Planed Flooring, Skirting, Moulding, &c.		Sashes and Doors.	Joinery.	Butter-boxes.	Cheese-crates.	Fruit-cases.	Other Products.	Total.	
					Quantity.	Value.			Quantity.	Value.								
	£	£	£	£	Ft. B.M.	£	£	£	Ft. B.M.	£	£	£	£	£	£	£	£	£
Auckland	638,186	934,415	1,409,494	2,982,095	127,717,775	1,519,830	100,542	1,620,372	25,177,474	574,644	94,228	160,965	186,918	31,081	31,243	396,459	1,475,538	3,095,910
Hawke's Bay	56,378	65,433	99,617	221,428	12,672,676	132,181	1,637	133,818	1,878,520	41,091	2,529	1,956	..	5,503	34,696	14,816	100,591	234,409
Taranaki	161,413	140,472	117,157	419,042	29,140,661	313,787	9,003	322,790	2,399,432	47,244	9,613	30,930	..	18,125	..	11,729	117,641	440,431
Wellington	239,580	225,268	427,994	892,842	41,326,120	466,886	33,597	500,483	11,139,481	250,163	16,077	30,032	24,266	41,980	658	90,958	454,134	954,617
Marlborough	7,853	10,916	..	18,769	1,609,911	17,493	2,609	20,102	..	..	..	..	..	..	..	..	..	20,102
Nelson.. ..	171,780	128,900	124,887	425,567	32,986,688	325,019	2,490	327,509	938,193	17,288	4,208	4,218	1,939	2,027	67,834	25,218	122,732	450,241
Westland	235,859	188,331	22,160	446,350	52,553,714	497,958	1,564	499,522	1,342,712	18,840	..	..	2,414	641	..	98	21,993	521,515
Canterbury	39,645	119,975	306,784	466,404	16,355,286	161,610	3,521	165,131	7,455,624	169,326	11,991	26,317	1,459	3,703	17,864	107,527	338,187	503,318
Otago—																		
Otago portion ..	41,180	53,177	203,146	297,503	10,728,480	102,848	621	103,469	5,293,558	132,904	22,538	16,974	..	7,434	15,332	25,400	220,582	324,051
Southland portion ..	117,425	120,153	111,935	349,513	25,656,318	272,473	273	272,746	2,348,151	42,409	..	..	142	14,910	4,198	56,703	118,362	391,108
Totals, 1943–44 ..	1,709,299	1,987,040	2,823,174	6,519,513	350,747,629	3,810,085	155,857	3,965,942	57,973,145	1,293,909	161,184	271,392	*217,138	*125,404	*171,825	728,908	2,969,760	6,935,702
,, 1942–43 ..	1,545,644	1,867,853	2,710,644	6,124,141	341,514,716	3,607,505	88,419	3,695,924	64,297,010	1,405,145	197,396	239,642	188,804	89,728	166,651	627,055	2,914,421	6,610,345
,, 1941–42 ..	1,424,163	1,583,082	2,727,892	5,735,137	324,473,600	3,254,340	22,099	3,276,439	67,502,800	1,382,354	301,917	378,048	237,362	102,850	144,481	315,090	2,862,102	6,138,541

* Butter-boxes made numbered 2,211,203 cheese-crates 866,708 fruit-cases, 3,820,554.

APPENDIX VII—*continued*

Sawmilling and Sash and Door Manufacturing, 1943–44—*continued*

Provincial District.	Motive Power used for: Hauling and Delivering — Kind of Engine: Steam.	Gas.	Petrol and Light Oil.	Oil (Heavy).	Electric.	Water.	Total.	Production of Sawn Timber from Logs — Total Horse-power available.	Kind of Engine: Steam.	Gas.	Petrol and Light Oil.	Oil (Heavy).	Electric.	Water.	Total.	Resawing, Dressing, and Manufacturing from Sawn Timber — Total Horse-power available.	Kind of Engine: Steam.	Gas.	Petrol and Light Oil.	Oil (Heavy).	Electric.	Water.	Total.	Approximate Value — Sawmill: Land and Buildings.	Tramways and Tram Plant.	Logging and Hauling Equipment.	Other Machinery	Total.	Planing and Resawing Mill: Land and Buildings.	Tramways.	Other Machinery	Total.	Total Value.
																								£	£	£	£	£	£	£	£	£	£
Auckland ..	66	..	119	43	6	1	235	9,053	91	3	36	17	195	1	343	8,978	15	..	8	2	539	1	565	6,937	211,326	136,960	187,924	251,868	778,078	176,360	20	154,586	330,966	1,119,044
Hawke's Bay	7	..	10	7	..	..	24	599	10	1	1	..	16	..	28	822	3	..	1	..	47	..	51	486	16,057	3,497	11,284	12,315	43,153	12,163	850	13,761	26,774	69,927
Taranaki ..	18	..	15	4	1	..	38	1,489	24	..	8	1	25	..	58	2,116	2	..	1	..	102	..	105	878	40,308	56,643	17,308	27,724	141,983	16,639	..	16,160	32,799	174,782
Wellington ..	39	..	32	27	1	1	100	2,624	28	..	14	13	32	..	87	2,131	13	..	1	..	168	..	182	2,308	26,428	29,493	48,333	65,175	169,429	64,281	..	57,987	122,268	291,697
Marlborough	1	..	3	1	1	..	6	163	2	..	4	1	3	..	10	228	..	..	..	..	..	..	..	..	2,884	..	2,134	3,834	8,852	..	..	..	..	8,852
Nelson ..	41	..	53	12	2	1	109	2,725	31	..	8	10	48	2	99	2,934	3	..	1	..	54	1	59	492	31,566	35,839	52,177	55,810	175,392	13,633	..	9,207	22,840	198,232
Westland ..	65	..	35	3	7	..	110	2,719	29	..	2	8	29	..	68	2,438	2	..	..	..	5	..	7	92	42,269	62,842	33,409	47,526	186,046	1,480	..	1,180	2,660	188,706
Canterbury	6	..	15	..	..	..	21	401	4	..	8	1	63	..	76	1,431	3	..	1	..	219	..	223	1,866	13,212	874	4,401	14,354	32,841	48,267	..	28,037	76,304	109,145
Otago—																																		
Otago portion	15	1	9	3	..	..	29	489	13	..	1	1	10	..	25	528	3	..	..	..	81	..	84	1,003	9,173	4,792	6,838	13,811	34,614	30,242	..	21,254	51,496	86,110
Southland portion	38	1	17	1	1	..	57	829	30	..	4	..	2	..	36	784	3	..	..	..	40	..	43	510	17,475	17,532	13,587	24,659	73,253	9,256	98	13,491	22,845	96,098
Totals—																																		
1943–44	296	2	308	101	19	3	729	21,091	262	4	86	52	423	3	830	22,390	47	..	13	2	1255	2	1319	14,572	410,698	348,472	377,395	517,076	1,653,641	372,321	968	315,663	688,952	2,342,593
1942–43	287	2	281	100	27	1	689	21,077	253	3	53	52	315	3	679	19,770	44	..	12	52	1137	2	1247	13,950	382,847	379,056	347,542	485,493	1,594,938	364,209	993	288,779	653,981	2,248,919
1941–42	318	3	216	84	20	..	641	18,923	277	1	59	43	284	7	671	19,392	47	..	2	55	1219	2	1325	14,304	342,310	380,330	337,321	478,444	1,538,405	351,712	1,024	279,849	632,585	2,170,990

Provincial District.	Number of Log-sawmills.	Approximate Sawn Output of various Kinds of Timber at Log-sawmills during the Year 1943–44 — Kauri.	Rimu.	Kahikatea.	Matai.	Totara.	Beech.	Tawa.	Miro.	Insignis Pine.	Other and Unspecified.	Total.	Average Mill Output.	Maximum Daily Capacity of Mills (8 Hours).	Area Cut
		Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Acres.
Auckland	115	4,308,495	62,219,774	7,248,317	6,493,569	5,258,302	7,820	2,760,651	262,111	36,775,925	2,382,811	127,717,775	1,110,589	786,255	11,675
Hawke's Bay	15	..	6,047,474	657,306	918,315	198,086	7,228	5,000	..	3,015,759	1,823,508	12,672,676	844,845	73,000	336
Taranaki	20	..	14,803,604	2,409,131	4,563,502	2,102,029	101,275	25,427	98,429	4,918,599	118,665	29,140,661	1,457,033	129,200	3,231
Wellington	45	..	20,998,390	2,108,535	6,118,763	3,430,087	80,431	10,326	524,150	7,765,442	289,996	41,326,120	918,358	203,800	3,117
Marlborough	8	..	557,759	31,379	22,261	5,000	21,308	..	..	932,587	39,617	1,609,911	201,239	13,180	107
Nelson	56	..	22,405,740	1,118,685	158,273	4,072	1,642,234	..	4,210	7,531,134	122,340	32,986,688	589,048	228,187	2,965
Westland	32	..	45,595,652	6,511,992	87,914	45,523	..	..	312,633	..	..	52,553,714	1,642,304	275,000	4,565
Canterbury	22	..	..	..	..	..	..	..	..	15,212,378	1,142,908	16,355,286	743,422	79,638	132
Otago—															
Otago portion	16	..	5,590,282	158,393	5,264	2,701	1,250,000	..	800	3,663,234	57,806	10,728,480	670,530	44,350	520
Southland portion ..	32	..	12,097,352	687,190	5,115	115,256	9,222,897	..	68,610	3,414,116	45,782	25,656,318	801,760	136,500	2,059
Totals, 1943–44 ..	361	4,308,495	190,316,027	20,930,928	18,372,976	11,161,056	12,333,193	2,801,404	1,270,943	83,229,174	6,023,433*	350,747,629	971,600	1,969,110	28,707
,, 1942–43 ..	330	2,645,516	198,985,914	24,357,456	19,338,392	11,983,752	10,928,375	1,304,173	1,375,177	67,067,054	3,528,907	341,514,716	1,034,893	1,876,682	28,655
,, 1941–42 ..	358	2,561,300	192,608,600	29,732,900	18,672,300	10,456,300	9,326,600	1,116,200	1,827,900	56,246,900	1,924,600	324,473,600	906,400	1,957,063	27,687

* Details for 1943–44 include eucalypts, 2,349,203 ft. b.m.; poplar, 1,701,720 ft. b.m.; tanekaha, 388,208 ft. b.m.; taraire, 381,557 ft. b.m.; rata, 344,815 ft. b.m.; pukatea, 199,922 ft. b.m.; macrocarpa, 112,649 ft. b.m.; mangeao, 64,443 ft. b.m.; hinau, 65,358 ft. b.m.; yellow pine, 54,605 ft. b.m.; other and unspecified, 362,953 ft. b.m.

APPENDIX VIII

SAWMILLS REGISTERED UNDER THE SAWMILL REGISTRATION REGULATIONS 1942

Conservancy.	Number of Sawmills registered as at 31st March, 1945.	Sawmills cutting mainly Indigenous Timber.	Sawmills cutting mainly Exotic Timber.
Auckland	115	85	30
Rotorua	56	47	9
Wellington	79	47	32
Nelson	68	55	13
Westland	49	49	..
Canterbury	31	2	29
Southland	54	42	12
Totals	452	327	125

APPENDIX IX

FOREST OFFENCES, 1944–45

Offence.	Law under which Proceedings were taken.	Number of Convictions.	Fines.	Costs and Damages.
			£	£ s. d.
Operating an engine which is not provided with efficient means of preventing the escape of dangerous sparks, &c.	Regulation 6, Forest (Fire-prevention) Regulations 1940	6	9	20 14 6
Failure to report or to fight a fire caused by sawmilling operations or leaving a fire before it was suppressed	Regulation 8, Forest (Fire-prevention) Regulations 1940	6	13	72 2 3
Lighting a fire in a fire district without a permit	Section 44 (1) (*c*) Forests Act, 1921–22	5	6	8 6 0
Entering a State forest without a permit	Regulation 12, Forest (Fire-prevention) Regulations 1940	16	26	25 17 6
Hunting in a State forest without a permit	Section 47, Forests Act, 1921–22	7	8	15 8 6
Causing a fire by firing incendiary bullet into a State forest	Section 44 (1) (*a*), Forests Act, 1921–22	1	2	2 17 0
Unlawfully cutting and removing timber from a State forest	Section 43, Forests Act, 1921–22	4	147	260 11 6
Unlawfully taking kauri-gum in a State Forest	Section 50, Forests Act, 1921–22	1	5*	0 10 0
		46	216	406 7 3

* Kauri-gum taken also forfeited.

APPENDIX X

Locations of Rehabilitation Projects

North Island.		South Island.	
Name of Project.	Locality.	Name of Project.	Locality.
Mangonui ..	North Auckland.	Golden Downs ..	Nelson.
Herekino ..	,,	Reefton ..	
Warawara ..	,,	Te Kuha ..	Westport.
Waitangi ..	,,	Moutere ..	Nelson.
Omahuta ..	,,	Granville ..	Totara Flat, Grey County
Puketi ..	,,	Rimu	Hokitika.
Russell ..	,,	Lake Ianthe ..	Westland.
Waipoua ..	,,	Hanmer ..	North Canterbury.
Puhipuhi ..	,,	Balmoral ..	,,
Whangarei ..	,,	Eyrewell ..	,,
Great Barrier ..	Auckland.	Ashley ..	,,
Riverhead ..	,,	Herbert ..	North Otago.
Maramarua ..	North Waikato.	Allanton ..	Otago
Whangapoua ..	Coromandel Peninsula.	Berwick ..	,,
Tairua ..	,,	Catlins ..	,,
Kauaeranga ..	Thames.	Naseby ..	Central Otago.
Katikati ..	Bay of Plenty.	Conical Hills ..	Tapanui – Otago.
Pureora ..	Main Trunk – Taumarunui.	Dusky ..	,,
Waiuiha ..	,,	Blue Mountains	,,
Rotochu ..	Bay of Plenty.	Pebbly Hills ..	Hedgehope, Southland.
Whakarewarewa	Rotorua.	Woodlaw ..	Southland.
Waiotapu ..	,,	Longwood ..	,,
Kaingaroa ..	Rotorua – Taupo.	Lillburn–Alton	,,
Whirinaki ..	Te Whaiti – Urewera.		
Mamaku ..	Rotorua.		
Tongariro ..	National Park.		
Erua	Main Trunk – Ohakune.		
Karioi ..	Main Trunk – Ohakune.		
Gwavas ..	Hawke's Bay.		
Masterton ..	Wairarapa.		

GLOSSARY

1. Indigenous

(*a*) *Softwoods :* —
Kahikatea or white-pine (*Podocarpus dacrydioides*).
Kaikawaka (*Libocedrus bidwillii*).
Kauri (*Agathis australis*).
Matai (*Podocarpus spicatus*).
Miro (*Podocarpus ferrugineus*).
Rimu (*Dacrydium cupressinum*).
Tanekaha (*Phyllocladus trichomanoides*).
Totara (*Podocarpus totara*).
Silver-pine (*Dacrydium colensoi*).
Yellow-pine (*Dacrydium intermedium*).

(*b*) *Hardwoods :*—
Beech (*Nothofagus* spp.).
Black-maire (*Olea cunninghamii*).
Fuchsia (*Fuchsia excorticata*).
Hinau (*Elaeocarpus dentatus*).
Mangeao (*Litsea calicaris*).
Pukatea (*Laurelia novae-zelandiae*).
Puriri (*Vitex lucens*).
Rata (*Metrosideros* spp.).
Rewarewa (*Knightea excelsa*).
Silver-beech (*Nothofagus menziesii*).
Taraire (*Beilschmiedia taraire*).
Tawa (*Beilschmiedia tawa*).

(*c*) *Other :*—
Miniature tree-fern (*Blechnum fraseri*).
Shoe-string fungus (*Armillaria mellea*).

2. Exotic

(*a*) *Softwoods :*—
American eastern white-pine (*Pinus strobus*).
Californian redwood (*Sequoia sempervirens*).
Corsican pine (*Pinus laricio*).
Douglas fir (*Pseudotsuga taxifolia*).
Insignis pine (*Pinus radiata*).
Jack pine (*Pinus banksiana*).
Larch (European) (*Larix decidua*).
Lawson's cypress (*Cupressus lawsoniana*).
Lodgepole pine (*Pinus murrayana*).
Macrocarpa or Monterey cypress (*Cupressus macrocarpa*).
Ponderosa pine (*Pinus ponderosa*).

(*b*) *Hardwoods :*—
Ash (*Fraxinus excelsior*).
Australian hardwoods, principally *Eucalyptus* spp.
Blue-gum (*Eucalyptus globulus*).
Chestnut (*Castanea sativa*).
Eucalupts (*Eucalyptus* spp).
Oak (*Quercus* spp.).
Plane (*Platanus* spp.).
Poplar (*Populus* spp.).
Stringy bark (*Eucalyptus eugenioides*).

(*c*) *Others :*—
Coconut palm (*Cocos nucifera*).

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